PREPARE AND PERFORM IN A DANGEROUS WORLD - TWO STUDIES OF ORGANIZATIONAL PERFORMANCE IN HAZARDOUS CONTEXTS

STUDY 1 - FIRM RESILIENCE TO TERRORISM

AND

STUDY 2 - SAFETY PREPAREDNESS AND PROJECT PERFORMANCE

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Submitted to
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In Partial Fulfillment
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DOCTOR OF BUSINESS ADMINISTRATION

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ABSTRACT

The world is an extraordinarily dangerous place with an array of escalating threats. Reports of terrorism, natural disasters, and political unrest are stark reminders of the dangerous context in which businesses must perform. To learn more about what firms can do to perform despite these dangers, we conduct two studies about the relationship between organizational preparedness and performance. The research question addressed by our first study is whether international businesses somehow convert previous terrorism exposures and/or experience operating in high-risk locations into an ability to bounce back quickly from future terrorist attacks. Our second study looks within the firm to see whether efforts to ensure workplace safety translate into performance. Our research addresses gaps in the literature concerning how firms maintain performance in a dangerous, uncertain world, and specifically into what organizational preparedness efforts help firms maintain performance despite unexpected disruptions. Our research contributes to a theory of organizational resilience and suggests to managers that business continuity planning and safety preparedness enhance resilience and performance in a dangerous world.

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STUDY 1 - FIRM RESILIENCE TO TERRORISM

INTRODUCTION

The increasing effect of terrorism on international business is at once a tragedy and a serious challenge to executives and researchers struggling to identify the factors that shape a firm's ability to deal with the threat of terrorism. Terrorism is a very real concern for multi-national enterprises (MNEs). As of 2014, businesses ranked fourth as a target of attacks, after the government and the police, but ahead of the military (Department of State Country Reports on Terrorism, 2015). Between 1968 and 2009, there were 16,301 fatalities associated with terrorist attacks on businesses (RAND Database of Worldwide Terrorism Incidents [RAND], 2015). Further, after a relative lull in the late 1990s prior to 9/11, fatal attacks on international businesses have increased, as shown in Figure 1.

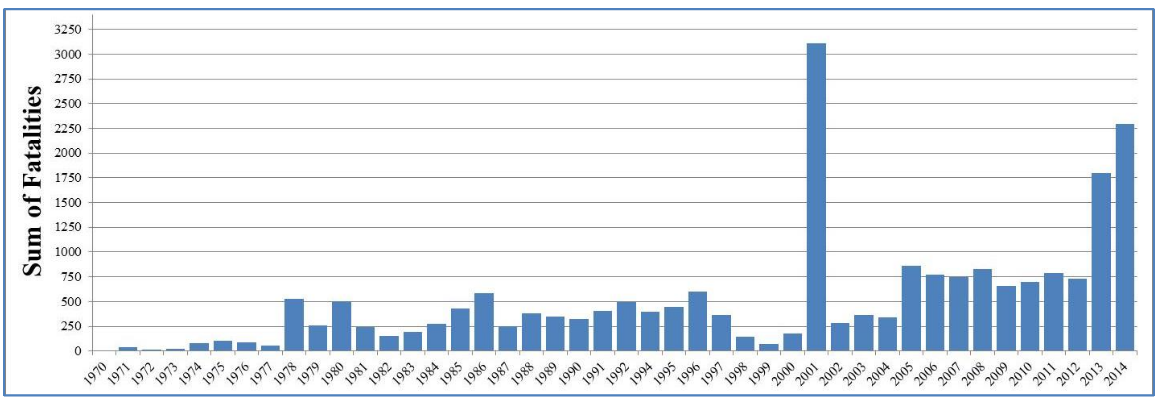

Figure 1 - Fatalities by Terrorist Attacks on International Business (Global Terrorism Database, 2015)

Unfortunately, business preparedness has not kept pace with the escalating threat (Bader & Berg, 2013; Czinkota, Knight, Liesch, & Steen, 2010). Before the catastrophic events of 9/11, terrorism was not a priority for business leaders (Jain & Grosse, 2009). For example, a pre-9/11 survey of 79 American MNEs in the Fortune 500 reported that 58 percent of the firms surveyed had no formal plan to deal with terrorism (Harvey, 1993). Surprisingly, even after 9/11, fully two-thirds of the firms surveyed did not view malicious activity, such as terrorism, as a threat to business (Cerullo & Cerullo, 2004). As recently as 2016, only 16 percent of firms surveyed by Clements Worldwide (2016) reported being as prepared for terrorism "as they could be" (p. 9).

International business research about managing the impacts of terrorism is scant (Czinkota et al., 2010). To illustrate the point, Figure 2 counts the number of times the words "terror," "terrorism", or "terrorist" appear in the article title and full text of scholarly journal articles from 1986 to 2016. Even after research on terrorism spiked following 9/11 (Figure 2), only seven articles with the word terror, terrorism, or terrorist were published in the *Journal of International Business Studies*, *Journal of International Management*, or the *International Business Review*.

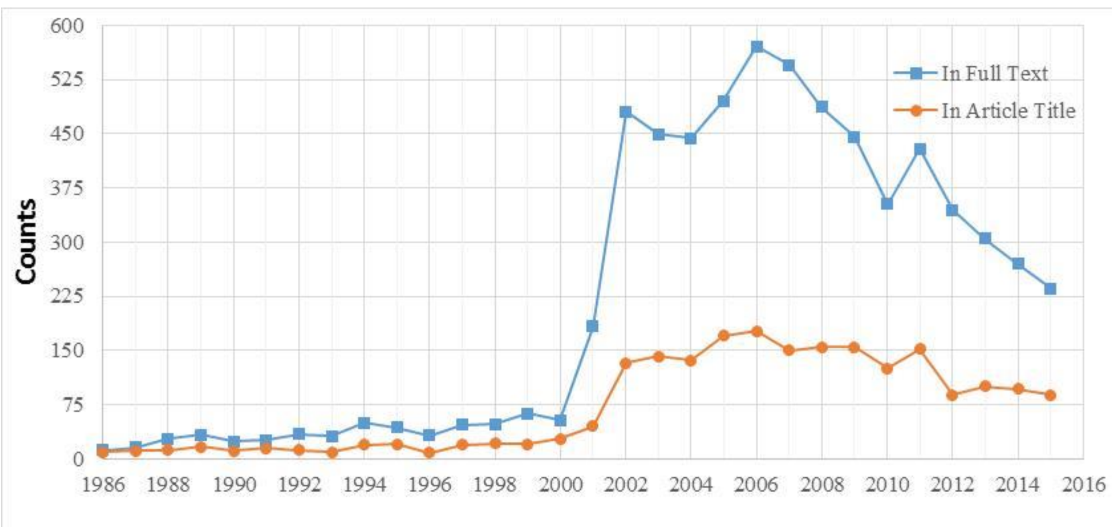

Figure 2 - Library Database ABI/INFORM Counts of Word Terror, Terrorist, or Terrorism in Scholarly Journal Articles

Moreover, international business research on terrorism often only focuses on describing the dimensions of the phenomenon, such as the economic impact of terrorism (Frey, Luechinger, & Stutzer, 2007). The most prominent articles in the area of international business and terrorism are Czinkota's (2005 & 2010). In particular, Czinkota et al. (2010) sketches a research agenda that emphasizes five future directions for researching terrorism with regard to international business: 1) Effects of Terrorism; 2) Human Resource Issues; 3) Global Supply Chain and Distribution Channels; 4) Organizational Preparedness; and 5) Strategy and Performance. Table 1 summarizes the seven terrorism articles in the three leading international business journals and categorizes them according to Czinkota's research agenda.

Table 1
Post 9/11 – Leading International Business Journals with Terror, Terrorism, or Terrorist in the Article Title

Journal Publication	Author(s), (Date)	Article Title	Topic (from Czinkota et al., 2010)
Journal of International Business Studies	Czinkota et al., 2010	Terrorism and international business: A research agenda	Overview
	Branzei & Abdelnour, 2010	Another day, another dollar: Enterprise resilience under terrorism in developing countries	Strategy and Performance
Journal of International Management	Bader & Berg, 2013	An empirical investigation of terrorism-induced stress on expatriate attitudes and performance	Human Resource Issues
	Czinkota, Knight, Liesch, & Steen, 2005	Positioning terrorism in management and marketing: research propositions	Global Supply Chain and Distribution Channels
	Li, Tallman, & Ferreira, 2005	Developing the eclectic paradigm as a model of global strategy: An application to the impact of the September 11 terrorist attacks on MNE performance levels	Strategy and Performance
	Bader & Schuster, 2015	Expatriate social networks in terrorism-endangered countries: An empirical analysis in Afghanistan, India, Pakistan, and Saudi Arabia	Human Resource Issues
International Business Review	Bader, Berg, & Holtbrügge, 2015	Expatriate performance in terrorism-endangered countries: the role of family and organizational support	

However, missing from Table 1 is an attention to organizational preparedness for terrorism and performance in the face of terrorist attacks. Our exploratory study addresses this gap by using publicly available data to investigate the effects of organizational preparedness on firm resilience to a terrorist attack. Our approach is informed by the Gittell, Cameron, Lim, and Rivas (2006) "story of organizational resilience" (p. 301), which tried to tease out the business factors that led some airline companies to successfully rebound after the 9/11 terrorist attacks "while others languished" (p. 300). In particular, we test the empirical association between prior terrorism exposures, experience in areas of high political risk, organizational preparedness, and firm resilience.

The next section of the paper provides an overview of the literature concerning international business and terrorism and sketches a conceptual model of several key relationships. We then articulate hypotheses concerning the relationships between prior terrorism exposure, breadth of experience in high-risk countries, organizational preparedness, and firm performance resilience and describe the data, variables, and analytic approach taken to examine these relationships. Next, we report our findings and discuss limitations and implications of these findings. Specifically, we pay extra attention to the role of business continuity planning in both forming a theory of organizational resilience and in bouncing back from terrorist attacks.

STUDY 1

LITERATURE REVIEW

“Terrorism” is a hard concept to define because, as the old adage goes, one person’s terrorist is another’s freedom fighter (Ganor, 2002; Liou & Lin, 2008). Although there are many definitions, one underlying characteristic of terrorism shared by many definitions is the use of violent conflict to induce widespread fear (Jain & Grosse, 2009). To this point, we define terrorism as “the deliberate use or the threat to use violence” (Ganor, 2002, p. 288) against non-combatants to spread fear (Jain & Grosse, 2009) “in order to attain political, ideological, and religious aims” (Ganor, 2002, p. 288). Sadly, terrorists increasingly attack soft targets, such as “hotels, banks and other business facilities” (Wernick, 2006, p. 62). Tightened security at public hard targets as well as the economic pain and fear inflicted by harming business personnel (Czinkota et al., 2010; Wernick, 2006) drives the shift toward attacks on business soft targets. Figure 3 provides a summary framework for differentiating terrorism from other types of violent conflict.

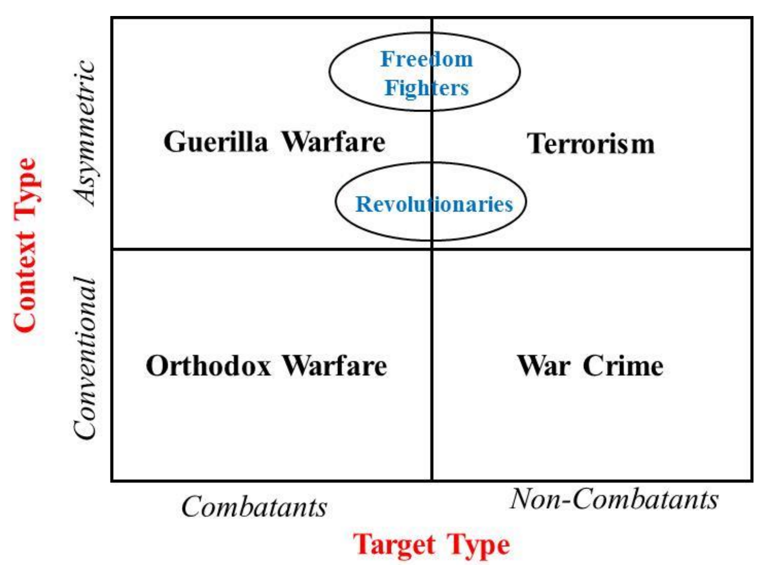

Figure 3 - Definition of Violent Conflict Framework (Adapted from Ganor, 2002)

Scholars have conducted considerable research concerning the effects on international business of political risk and violent conflicts related to guerilla warfare, orthodox warfare, and war crimes (Henisz, Mansfield, & Von Glinow, 2010). However, there is "scant scholarly attention paid in international business to the evolving role of terrorism" (Henisz et al., 2010, p. 763). Although Jain and Grosse (2009) suggest a variety of ways in which MNEs might reduce terrorism by addressing the root causes of poverty and hatred or by developing security technologies, most recent management research into the effects of terrorism on MNEs focuses on the impact of terrorist attacks on firms and ways of improving recovery from such attacks.

One stream of research on terrorism within international business focuses on human resource impacts. For example, Reade (2009) shows that higher sensitivity to terrorism leads to less positive feelings about an organization and team. Likewise, Bader and Berg (2013) show that exposure to terrorism increases stress in expatriates and decreases expatriates' performance and attitudes toward their host country. Similarly, Bader and Schuster (2015) document the negative impact on psychological well-being of United States (U.S.) expatriates operating in high-risk, terrorism-endangered countries in Southwest and Southeast Asia. For their part, Liou and Lin (2008) use the Bali bombings in 2002 and 2005 to propose a framework for assessing the impact of unanticipated terrorist attacks on human resource planning and firm performance. Emerging from this research is the idea that it is important – and quite challenging – to learn from past attacks and use that knowledge to prepare employees to withstand, and perform despite, current tensions or future attacks.

A second stream of management research on terrorism, explores firm readiness and the performance impact of such preparation. In particular, several authors examine the relationship between business continuity planning and the mitigation of the impact from unanticipated disasters such as terrorism (Cerullo & Cerullo, 2004; Zsidisin, Melnyk, & Ragatz, 2005). According to Cerullo and Cerrullo (2004), there is clear evidence from past catastrophes that international businesses without business continuity plans are ill prepared and have a lower probability of surviving unanticipated disasters such as terrorism, earthquakes, floods, and hurricanes. Indeed, "companies that have crisis management procedures in place recover 2.5 times faster after a crisis than companies that do not" (Housel, El Sawy, & Donovan, 1986, p. 389). Accordingly, scholars suggest that firms could mitigate the impact of terrorism through the development of contingency plans (Czinkota et al., 2010; Henisz et al., 2010). In particular, transforming from an "active/backup" to an "active/active" business continuity planning model in which two geographically separated sites provide inherent active backup (Security Exchange Commission, 2002) has proven to be effective. For example, despite the unthinkable and tragic loss of 658 employees, Cantor Fitzgerald recovered more quickly from the 9/11 attack than did its peers because it had previously built an "active/active" disaster recovery site in Rochelle Park, New Jersey after the 1993 attack on the World Trade Center (Parlons Affaires, 2012). In short, this stream calls attention to the potential usefulness of business continuity planning in transforming previous exposure of tragedy into effective responses to future tragedy (see, for example, 911 Commission's call for business continuity planning as a response to 9/11, Kean & Hamilton, 2004).

A third, related stream of literature on terrorism and international business has begun to explore the sources of resilience to attack, and the strategic advantages of developing that resilience. We show the key factors affecting firm resilience in Table 2.

Table 2
Firm Performance Resilience Factors

<table>
<tr><th>Factor</th><th>Description</th><th>Source</th></tr>
<tr><td>Slack Resources</td><td>Financial, cognitive, emotional, and relational</td><td rowspan="3">Vogus & Sutcliffe, 2007; Zollo & Winter, 2002</td></tr>
<tr><td>Processes and Practices</td><td>Cognitive, formal, informal, and decision making</td></tr>
<tr><td>Learning</td><td>Direct experience as well as Deliberate and vicarious learning</td></tr>
<tr><td>Reliability</td><td>Of systems, functions, processes, and organizations</td><td>Henry & Ramirez-Marquez, 2012; Vogus & Sutcliffe, 2007</td></tr>
<tr><td>Organizational Preparedness</td><td>Business Continuity and Disaster Recovery Plans</td><td>Czinkota et al., 2010; Fowler, Kling, & Larson, 2007</td></tr>
<tr><td>Extreme Event</td><td>Organizations bounce back from a crisis</td><td>Czinkota et al., 2010; Gal, 2014; Gittell et al., 2006; Henry & Ramirez-Marquez, 2012; Werther, 2014</td></tr>
</table>

Generally, resilience features a two-phase “concept of change” (Werther, 2014, p. 428). The first phase of resilience addresses the ability to bounce back or rebound following a crisis (Gal, 2014; Gittell et al., 2006; Henry & Ramirez-Marquez, 2012; Werther, 2014). The second phase of resilience involves making changes to the organization that help it grow stronger and more resilient to facing renewed threats (Vogus & Sutcliffe, 2007). The mechanism underlying this theory of resilience seems to be deliberate learning from experience (Zollo & Winter, 2002) resulting in a re-organization of systems, processes, and organization behaviors based on previous shocks (Egeland, Carlson, & Sroufe, 1993). For example, Starr, Newfrock, and Delurey (2003) report on how, after weathering a potentially debilitating fire at their factory, a Nordic telecommunications manufacturer instituted more failsafe and troubleshooting systems into their supply chain network and thereafter were able to increase market share by three percent. Similarly, research shows that small firms with previous experience coping with uncertainty and violence often profit in highly volatile environments marked by frequent acts of terrorism (Branzei & Abdelnour, 2010).

Our research focuses primarily on the first phase of resilience, the bounce back phase, with particular emphasis on the "ability and capacity to withstand systemic discontinuities and adapt to new risk environments" (Starr et al., 2003, p. 3). The ability to bounce back, mitigate, and endure disruptions and discontinuities can create a sustained competitive advantage over less adaptive firms (Starr et al., 2003). In particular, we concentrate on testing the impact of learning (Vogus & Sutcliffe, 2007) and increased organizational preparedness (Czinkota et al., 2010; Fowler et al., 2007) in response to extreme events (Henry & Ramirez-Marquez, 2012).

STUDY 1

CONCEPTUAL MODEL AND HYPOTHESES

Building on the idea that prior experience could help create resilience to terrorism, we posit (Figure 4) that prior direct exposure to terrorist attacks, experience in high-risk countries, and business continuity planning will combine to improve firm performance resilience, but time since the last terrorist attack will erode preparedness.

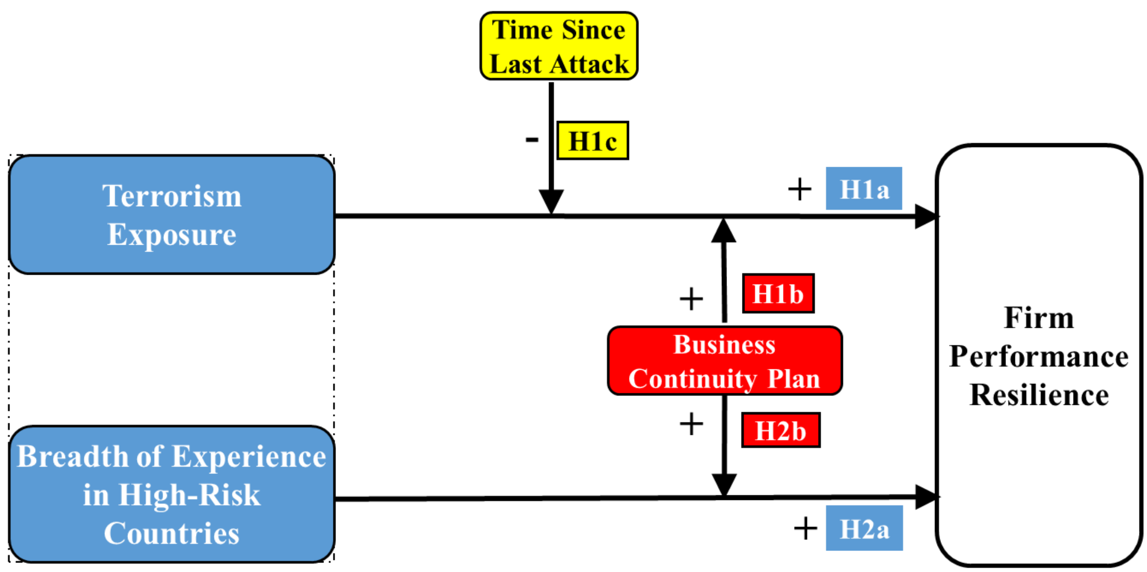

Figure 4 – Firm Resilience to Terrorism Model

Terrorism Exposure is the impact resulting from a direct terrorist attack on firm before a new terrorist incident; any deliberate learning (Zollo & Winter, 2002) based on previous exposure might be attenuated (negatively moderated) by the passage of *Time Since the Last Attack*.

Breadth of Experience in High-Risk Countries reflects a firm's broader experience coping with discontinuous risks, including violent conflict, terrorist, and threats, in countries with high levels of political risk.

While a broad concept, we operationalize *Organizational Preparedness* as the existence of a business continuity plan. We expect such plans to enhance (positively moderate) the learning from terrorism exposures and experience in high-risk countries.

Finally, *Firm Performance Resilience* is an outcome operationalized as the ability to bounce back, mitigate, and absorb disruptions and discontinuities (Starr et al., 2003).

Building on this model, we develop two sets of hypotheses concerning the relationships between the two independent variables, *Terrorism Exposure* and *Breadth of Experience in High-Risk Countries*, the two moderating variables, *Time Since Last Attack* and *Business Continuity Plan*, and the dependent variable, *Firm Performance Resilience*.

Hypotheses 1: Terrorism Exposure and Firm Performance Resilience

First, because of an organization's ability to learn from previous experience (Vogus & Sutcliffe, 2007) and so increase market share (Starr et al., 2003), we expect a firm's previous exposure to terrorism incidents to show a positive association with firm performance resilience. The positive association would take the form of a quicker stock price bounce back than a firm with less prior terrorism exposures.

Hypothesis 1a *- Prior exposures to terrorism positively relates to a firm's performance resilience after a subsequent terrorist attack.*

Business continuity planning captures and activates previous learning as new and integrated processes and procedures (Cerullo & Cerullo, 2004; National Fire Protection Association 1600, 2016; Starr et al., 2003). As a result, we expect that firms with an existing business continuity plan will be able to absorb a terrorist attack and bounce back faster than firms without a business continuity plan (Fink, 1986; Housel et al., 1986). That is, we expect the existence of a business continuity plan to serve as a positive moderator of the relationship between *Terrorism Exposure* and *Firm Performance Resilience*.

Hypothesis 1b *- The existence of a business continuity plan makes the relationship between terrorism exposure and firm performance resilience more positive.*

On the other hand, time erodes attention and preparedness (Redlener & Berman, 2006), as well as market awareness of a firm's previous performance under duress (Starr et al., 2003). Therefore, we expect organizational preparedness and the ability to rebound from or resist the impacts of a terrorism incident to degrade with the passage of time since the latest previous terrorist attack.

Hypothesis 1c *– The longer the elapsed time between a prior exposure to terrorism and a subsequent exposure, the less positive the association between terrorism exposure and firm performance resilience after a subsequent terrorist attack.*

Hypotheses 2: Experience in High-Risk Countries and Firm Performance Resilience

The second set of hypotheses relates a firm's experience operating in high-risk countries to firm performance resilience. We expect firms with a breadth of experience operating in high-risk countries will deliberately learn from the accumulation of this high-risk experience (Zollo & Winter, 2002) and continually align and adapt systems, procedures, and capabilities to mitigate the risk exposure, even if the firm itself has not suffered a terrorist attack. We define high-risk locations as countries where there is a high likelihood of unanticipated discontinuities (Fitzpatrick, 1983), underdeveloped and weak institutional environments (Makhija & Stewart, 2002), and/or violent conflict (Darendeli & Hill, 2016; Henisz et al., 2010) that could adversely affect the performance goals of the enterprise (Hood & Nawaz, 2004). Due again to organizational learning (Cuervo-Cazurra & Genc, 2008) and knowledge codification from past experience (Zollo & Winter, 2002), we expect that firms with substantial experience operating in high-risk countries will be better able to absorb the shock of terrorism and recover faster from a subsequent terrorist incident than firms without such experience. Similarly, we expect that the capital market, will take note of firms that have demonstrated success operating in high-risk countries and are thereby more likely to be able to respond effectively to a terrorist attack (Chen & Siems, 2004). In other words, we expect a firm's prior experience coping in high-risk countries to relate positively to firm performance resilience in that, for such firms, the stock price will bounce back more quickly after a subsequent terrorist attack than will be the case for firms without such experience. Thus,

Hypothesis 2a - *The firm's operating experience in high-risk environments positively relates to firm performance resilience after a terrorist attack.*

As in Hypothesis 1, we propose that the existence of a business continuity plan will positively moderate the relationship between the breadth of firm's experience in high-risk countries and *Firm Performance Resilience*.

Hypothesis 2b - *The existence of a business continuity plan makes the relationship between the breadth of experience operating in high-risk countries and firm performance resilience more positive.*

In the next section, we discuss the data, measures, and analysis used to test these hypotheses.

STUDY 1

METHOD: DATA, VARIABLES, AND DATA ANALYSIS

This exploratory study examines the relationship between prior exposures to terrorism incidents, the breadth of a firms' experience in high-risk countries, business continuity planning, the time since the last terrorist attack, and firm performance resilience.

Data

Frey et al. (2007) breaks the indicators of terrorism into three principal categories, as shown in Table 3. First, traditional measures of terrorism count the instances of terrorism incidents. Although the count of terrorism incidents is easily measured, the count of terrorism incidents does not represent the extent of the terrorist incident (Frey et al., 2007). For example, using counts, the San Bernardino attack on December 2, 2015, which killed 14 and wounded 22 people, is measured the same as the taking of one hostage. A variation of the count indicator is the number of fatalities or injuries (Branzei & Abdelnour, 2010); this variation adds some sense of the impact of any given incident.

The second type of measure is *economic loss*. This measure is calculated as the loss of economic prosperity by people, firms, or governments and is derived from impact studies of the resulting damages (Frey et al., 2007). The *economic loss* measurement captures the direct market value impact of terrorism, but do not fully account for intangible losses. Finally, the third category of measurement of impact is *utility loss*, often used in human resource journal articles concerning terrorism. The *utility loss* category captures the qualitative indirect and intangible losses of terrorism, such as well-being and emotional impact. For access reasons to secondary data in this incident level study, we use the cumulative number of terrorist incidents to measure the firm's prior exposure to terrorism.

Table 3
Measurements of Terrorism (Adapted from Frey et al., 2007)

Category	Description	Metric	Discipline	Reference
Traditional	• Quantity focused • Easily measured • Time series statistics	# Incidents # Fatalities # Injuries # Fatalities per incident	• International Business • Human Resources • Strategic Management	Branzei & Abdelnour, 2010; Czinkota et al., 2010; Czinkota et al., 2005; Frey et al., 2007; Harvey, 1993; Liou & Lin, 2008
Economic Loss	• Transaction monetary direct quantitative damages • Impact studies • Market value loss of economic prosperity	• Capital market loss • Foreign direct investment • Foreign trade • Tourism loss • Urban economy	• Economics • International Business • Strategic Management	Czinkota, 2005; Czinkota et al., 2010; Frey et al., 2007; Jain & Grosse, 2009; Liesch, Steen, Knight, & Czinkota, 2006
Utility Loss	• Non-market value qualitative based effects • Indirect effect • Psychological • Well-being	• Cost of living, relocation, and wage differentials • Life satisfaction surveys • Exit costs • Contingent valuation surveys	• Human Resources • International Business	Bader & Berg, 2013; Frey et al., 2007; Liou & Lin, 2008; Reade, 2009

We obtain data on terrorism from the open-source Global Terrorism Database (2015), known as the GTD, which is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). START is a Department of Homeland Security Center of Excellence at the University of Maryland, tasked by the Department of

State to collect statistical data on terrorism in support of the annual Country Reports on Terrorism. The GTD (2015), accompanied by an instructive codebook, contains 141,967 rows and 108 columns of data since 1970 categorized and coded into fields, as shown in Table 4. When necessary, we augment the GTD with terrorism data collected in the RAND Database of Worldwide Terrorism Incidents, a compilation of 40,000 incidents of terrorism coded and detailed from 1968 to 2009 (RAND, 2015). Finally, we gather industry and incident level, survey data from academic journals and public entities including insurance providers.

Table 4
Categorization of the Global Terrorism Database (2015)

Category	Global Terrorism Database Fields
GTD ID # & Date	Event Identification Number, Year, Month, Day
Incident Information	Criteria 1: Political, Economic, Religious, or Social Goal; Criteria 2: Intention to Coerce, Intimidate or Publicize to Larger Audience; Criteria 3: Outside International Humanitarian Law
Incident Location	Country, Region, Province/State, City/Town, Longitude, Latitude
Attack Information	Attack Type1, Attack Type2, Attack Type3,
Weapon Information	Weapon Subtype1,Weapon Subtype2, Weapon Subtype3, Weapon Subtype4,
Target/Victim Information	Target Type1, Target Subtype1, Target1, Nationality1, Target Type2, Target Subtype2, Target2, Nationality2, Target Type3, Target Subtype3, Target3, Nationality3
Perpetrator Information	Group Name1, Group Subname1, Group Name2, Group Subname2, Group Name3, Group Subname3, # Perpetuators, # Perpetuators Captured, Claim Responsibility1, Competing Claim, Claim Responsibility2, Motive
Casualties and Consequences	# Killed, # Killed US, # Wounded US, Extent of Property Damage, Value of Property Damage, # Hostage Kidnapped, # Hostage Kidnapped U.S., # Hours of Kidnapping/Hostage, # Days, Kidnapped Hijacked Country, Ransom Amount, Ransom U.S., Ransom Paid, Ransom Paid U.S., Ransom Note, Hostage Kidnapped Outcome, # Released/Escaped/Rescued
Additional Sources	Target/Victim Perpetrator Names, Mode for Claim of Responsibility Notes, Kidnapped/Hostage Age Outcome Notes, 1st Source, 2nd Source, 3rd Source, Database Source

To assess the required sample size in our multiple regression analysis, we use Soper's online calculator (Soper, 2010). We create a scatter plot of the minimum sample size at a range of the anticipated effect sizes given a probability level of 0.05, the five predictor variables in our conceptual model, and the generally accepted statistical power threshold of 0.8 (Cohen, 1988). Based on the availability of stock price data for measuring the dependent variable in this incident level analysis, we focus on Fortune 1000 MNEs since 1990, which narrowed down the possible incidents from 141,967 in the GTD to 158 terrorist incidents across 37 different MNEs.

Variables

Table 5 identifies and operationalizes the independent, moderating, control, and dependent variables used in the conceptual model of terrorism and international business.

First, *Firm Performance Resilience* is the dependent variable. Consistent with Gittell et al.'s (2006) study of the airline industry after 9/11, we measure resilience as the number of days it takes for a firm's stock price to rebound to the price on the trading day prior to the terrorist attack. The idea here is that the shock of a terrorist attack would drive the stock price down, but more resilient firms would bounce back faster.

Table 5
Description of Variables in the Terrorism and International Business Conceptual Model

Name	Type	Description	Measurement	Source
Firm Performance Resilience	Dependent Variable	Ability and capacity to endure systemic disruptions and adapt to changing risk environments (Starr et al., 2003)	Number of days it takes for the stock price to rebound to the to the price at the close of the trading day prior to the terrorist attack	CRSP and Compustat Global from WRDS (2016)
Terrorism Exposure	Independent Variable	Depth of experience gained from direct effects of terrorism incidents	Cumulative number of incidents before the focal incident	GTD (2015)
Breath of Experience in High-Risk Countries		Breadth of experience acquired from businesses exposed to broader discontinuous disruptions	% = Number of firm operations in high-risk countries (defined as countries where Department of State provides danger pay)/total number of countries firm operates	GTD (2015); Company Annual Reports form Mergent Online (2016); Company Website
Business Continuity Plan	Moderating Variable	Existence of a Disaster Recovery Plan, Emergency Response, Crisis Management, or Business Continuity Plan	1 = Firm has a Business Continuity Plan 0 = Firm doesn't have a Business Continuity Plan	Company Annual Reports from Mergent Online (2016)
Time Since Last Attack	Moderating Variable (for Terrorism Exposure)	Deterioration of performance resilience over time since the last terrorist incident	Number of days since last terrorist incident	GTD (2015)
Size of the Company	Control Variable	Represent size of the firm	Size of the company measured as # of employees in 2016	Mergent Online (2016)
Market Index		Fluctuations in the stock price due to broader market related conditions	Standard & Poor's 500 level index on the day of the terrorist attack	CRSP Stock Indexes from WRDS (2016)

For the events studied, we used the GTD Event Identification Number to obtain the year, month, and day of the terrorist incident. We then sourced the stock prices for firms traded on U.S. stock exchanges from the Center for Research in Security Prices (CRSP) Daily

Stock tab on the Wharton Research Data Services (WRDS, 2016) platform and the stock prices for firms traded on international stock exchanges from the Compustat Global Security Daily tab on the WRDS (2016) platform. To account for reporting delays or a terrorist attack that occur after the market closed, we used the stock price at the close of the trading day prior to the terrorist attack as our initial value and calculated the number of days it took the stock price to bounce back to that level.

Terrorism Exposure is an independent variable representing the cumulative number of terrorist incidents directly on the firm prior to the focal terrorist incident as identified in the GTD.

Breadth of Experience in High-Risk Countries reflects the proportion of high-risk countries, as a fraction of the total countries in which the firm operates. A high-risk country is defined as a country in which “civil insurrection, civil war, terrorism, or wartime conditions threaten physical harm or pose imminent danger to the health or well-being of the employee” as noted in the U.S. Department of State Standardized Regulations (DSSR, 2016, para. 652a). The numerator of the fraction is the number of high-risk countries in which the firm has operations from the company annual reports on Mergent Online (2016), the GTD, and the company’s website. The denominator is the total number of countries in which the firm has operations from the 2016 company annual report.

The *Business Continuity Plan* moderating variable represents the existence (1) or non-existence (0) of an established Disaster Recovery, Emergency Response, Crisis Management, or Business Continuity Plan as of 2016. Our research draws the existence of such plans from a search of company annual reports on Mergent Online (2016).

We measure the *Time Since Last Attack* moderating variable as the number of days since the most recent previous terrorist incident experienced by the firm to the day of the last attack, as indicated by the difference between Event Identification Numbers from the GTD.

Finally, we add control variables to control for factors beyond the relationships in our model. The *Size of the Company* is a control variable measured as the number of full time employees working in the firm per Mergent Online (2016); the intuition is that larger firms might be more resilient to terrorism than smaller firms. *Market Index* is a control variable to account for broader fluctuations in the stock price. The Standard and Poor's Stock 500 Index measures the *Market Index* control variable on the day of the terrorist attack from the CRSP Stock Market Index on the WRDS (2016) platform. Since we measure the dependent variable, *Firm Performance Resilience*, as the time it takes for a firm's stock price to bounce back after a terrorist attack, we control for changes in the firm's stock price driven by the broader market fluctuations that affect the bounce back time not related to a terrorist attack.

Data Analysis

First, we conducted an outlier analysis of the dependent variable using the standardized residual as well as the interquartile range method. To execute the standardized residual analysis, we created and reviewed:

a) Case numbers with high standardized residuals in the regression Casewise Diagnostics table;

b) Histogram charts with frequency (y-axis) versus standardized residual (x-axis);

c) Cumulative probability plot with expected (y-axis) versus observed (x-axis);

d) Scatter plot (see Figure 5) of the standardized residual (y-axis) versus standardized predicted value (x-axis).

The scatter plot of the residuals not only identified outliers, but also validated homoscedasticity, or the consistency of the variance. The second method for evaluating outliers analyzed the interquartile range (difference between 75 and 25 percentiles) and stem and leaf plots to identify extreme outlier values. We removed outliers with standardized residuals greater than 3.0 where the stem-leaf plots from Statistical Package for Social Sciences (SPSS) identified the same cases as candidates for removal. Because of these two robust outlier analyses, we eliminated the following four cases of outliers (see Figure 5): case #19 – IBM; case #129 – Ford; case #142 – Mazda; and case #152 – Peugeot. The elimination of outliers reduced the sample size from 158 to 154. Appendix A identifies the 37 different Fortune 1000 MNEs in our sample and tabulates the number of terrorist incidents by MNE in our final sample of 154.

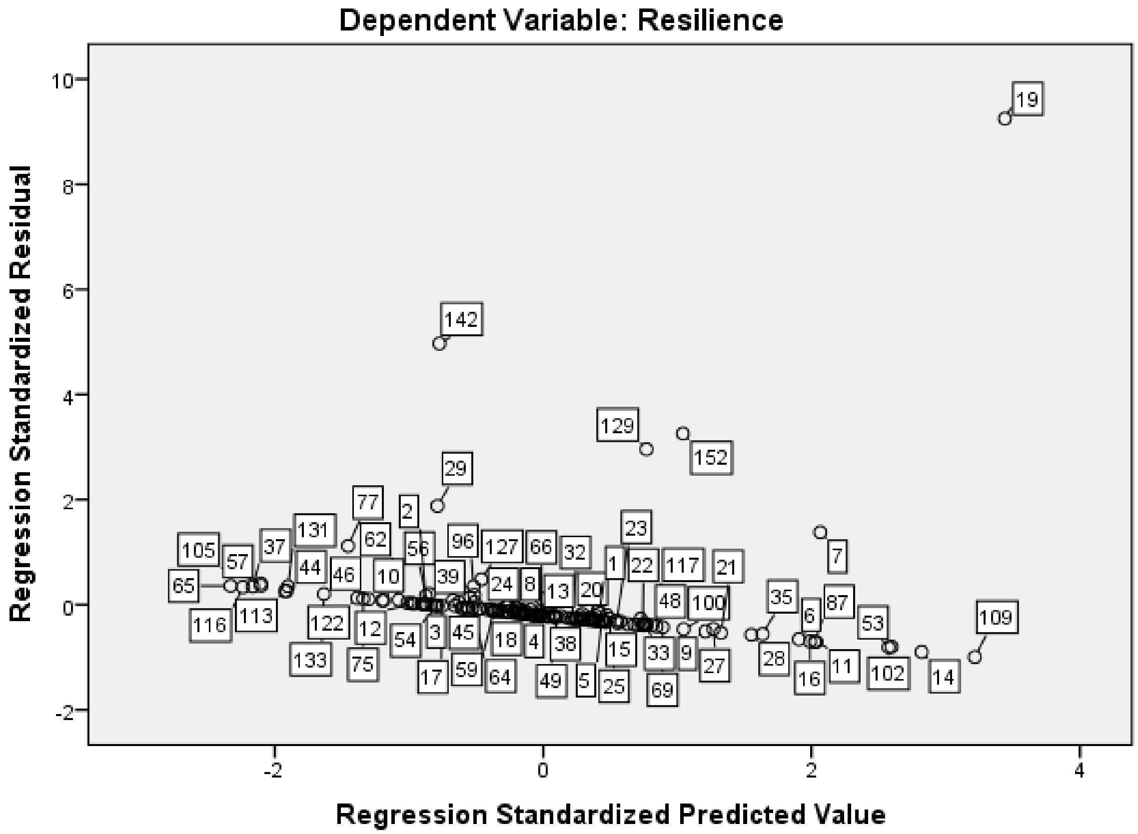

Figure 5 – Scatterplot of Residuals

We tested the hypotheses using linear regression. Before testing, we conducted skewness and kurtosis tests. We plotted frequency histograms of the independent, moderating, and control variables to determine whether the variables followed distributions appropriate to our analysis. We divided the skewness and kurtosis statistic by the associated standard error. If the statistic divided by the standard error was greater than plus or minus 1.96, it indicated the data is not normally distributed (Rose, Spinks, & Canhoto, 2014). As a result of the these tests and histogram plots, we transformed the: control variable, *Size of the Company;* independent variables, *Terrorism Exposure* and *Breadth of Experience in*

High-Risk Countries; and moderating variable, *Time Since Last Attack*. We transformed the data for the variables not normally distributed such that the new transformed data was normally distributed and less skewed. Specifically, we performed a log transformation applying the "Lg10" function under the "Transform/Compute Variable" menu of IBM's SPSS.

After the variable transformations, we ran a correlation analysis between the operationalized independent variables, moderating variables, and the dependent variable. The correlation analysis checked for collinearity and began to identify and evaluate non-causal associations and the strengths of the relationships between variables. See Appendix B for the correlation results.

We conducted an overall test of the statistical significance of the conceptual model from Figure 4 using the Analysis of Variance (ANOVA) and Fisher (F) test in linear regression. To execute the analysis in this exploratory study, the five hypotheses translate into the five paths identified below for linear regression analysis, using IBM's SPSS version 23. The paths represent the relationships between the independent, moderating, and the dependent variables used in the linear regression, which determines whether the set of independent variables predict the dependent variable (outcome).

Hypothesis	Paths Using SPSS Regression
1a	FPR ~ $a_1 + b_1$TE
1b	FPR ~ $a_2 + b_2$(TE x BCP)
1c	FPR ~ $a_3 + b_3$(TE x TLA)
2a	FPR ~ $a_4 + b_4$ERC
2b	FPR ~ $a_5 + b_5$(ERC x BCP)

The abbreviations in the paths are:

FPR = *Firm Performance Resilience*

TE = *Terrorism Exposure*

ERC = *Breadth of Experience in High-Risk Countries*

TLA = *Time Since Last Attack*

BCP = *Business Continuity Plan*

Notes: a_i *= constant;* b_i *= regression coefficient*

To create the moderation interaction in Hypothesis 1b, 1c, and 2b, we standardized the values of the scale variables. We then multiplied the independent variables, *Terrorism Exposure* and the *Breadth of Experience in High-Risk Countries,* by the corresponding moderating variables, *Time Since Last Attack* and *Business Continuity Plan*, in the paths to create a product term using the compute variable function in SPSS. We standardized the scale variables to mitigate multi-collinearity issues between the moderating product term and the independent variables in the linear regression.

We tested the hypotheses by assessing directionality, statistical significance, and the strength of the relationships in the regression. The sign of the unstandardized regression coefficient (B) in the regression paths tested the directionality posited in the hypotheses. We assessed the statistical significance for each predictor variable in the regression using T-tests. Finally, we evaluated the strength of the relationship by analyzing the standardized regression coefficient (Beta).

Our research measured the dependent variable in terms of days it takes the stock price to bounce back. The fewer days it took the stock price to bounce back from a subsequent terrorist attack the more positive the association between *Firm Performance Resilience* and the independent variables, *Terrorism Exposure* and *Breadth of Experience in High-Risk Countries*. Therefore, if our hypotheses hold, we would expect a negative sign in the correlation analysis and a negative sign in the unstandardized regression coefficient between the independent variables, *Terrorism Exposure* and *Breadth of Experience in High-Risk Countries,* and the dependent variable, *Firm Performance Resilience*.

STUDY 1

RESULTS

The Pearson coefficients in Appendix B showed two statistically significant non-causal associations between variables. First, there is a statistically significant (at the 0.01 level) and negative correlation of -0.338 between the independent variable, *Terrorism Exposure,* and the moderating variable, *Business Continuity Plan*. Second, there is a statistically significant (at the 0.01 level) and a positive correlation of 0.527 between the independent variable, *Terrorism Exposure,* and the moderating variable, *Time Since Last Attack*.

For a more robust test, we conducted a two-part analysis using a series of hierarchical linear regressions, summarized in Table 6. Model 1 consists of the constant and control variables of *Market Index* and *Size of the Company* as predictor variables. Models 2 and 3 add the independent variables to the constant and control variables. Model 2 explores the relationships between the independent variable, *Terrorism Exposure,* and the dependent variable, *Firm Performance Resilience*. Model 3 adds the independent variable, *Breadth of Experience in High-Risk Countries,* analyzing the relationships between both independent variables and *Firm Performance Resilience*. Models 4 and 5 add the moderating variables to the independent variables, constant, and control variables from the prior models. Specifically, Model 4 adds the moderating variable, *Time Since Last Attack,* and Model 5 adds the *Business Continuity Plan* moderating effect and fully represents our conceptual model from Figure 4.

Table 6 Model and ANOVA Summary – Resilience to Terrorism				
Model	Predictor Variables	R Square	F	Sig.
1	Constant, Market Index, Size of the Company	.003	.204	.815
2	Constant, Market Index, Size of the Company, Terrorism Exposure	.004	.195	.900
3	Constant, Market Index, Size of the Company, Terrorism Exposure, Breadth of Experience in High-Risk Countries	.004	.168	.954
4	Constant, Market Index, Size of the Company, Terrorism Exposure, Breadth of Experience in High-Risk Countries, Time Since Last Attack Moderator	.022	.675	.643
5	Constant, Market Index, Size of the Company, Terrorism Exposure, Breadth of Experience in High-Risk Countries, Time Since Last Attack Moderator, BCP Terrorism Exposure Moderator, BCP Breadth of Experience in High-Risk Countries Moderator	.022	.479	.849
Dependent Variable: Firm Performance Resilience				

The Model and ANOVA Summary in Table 6 shows the amount of variance explained by the predictor variables for each model, as represented by the R-Square value, and the statistical significance (Sig.) of the model F-test. The highest R-Square value in Models 4 and 5 is 0.022, which means the predictor variables in our conceptual model (Model 5) only explains 2.2 percent of variance in the dependent variable, *Firm Performance Resilience*. Since we are using secondary data in this exploratory study, we expected the models would result in low R-Square values. However, the Model and ANOVA Summary indicates no models, including our conceptual model (Model 5), are statistically significant.

As a follow-up to the model testing, the second part of our extended analysis evaluated the relationships between the variables in each of the models to test the hypothesis. The

Regression Coefficients Summary (see Table 7) provides the individual standardized regression coefficient (Beta), the unstandardized regression coefficient (B), the statistical significance (Sig.), the associated hypothesis, and the collinearity statistics, known as the variance inflation factor (VIF), for each of the predictor variables.

We analyze collinearity statistics, including the Tolerance and VIF (1/Tolerance), from the regression output coefficients in Table 7, to detect any overlap or similarity between the explanatory variables. Positively, the VIF results were below 4.0, validating that multi-collinearity was not an issue in the regression models (Simon, 2004).

The hierarchy of the regression models and predictor variables in the Regression Coefficients Summary of Table 7 mirrors the hierarchy in Table 6.

Regrettably, the results of the model F-test and regression coefficient T-tests are not statistically significant, indicating that neither the directionality (sign of the unstandardized regression coefficient, B), nor the strength of the relationship (size of the standardized regression coefficient, Beta), between the independent variable, *Terrorism Exposure,* and the dependent variable, *Firm Performance Resilience,* could be interpreted in the models.

Likewise, we could not interpret the sign of the unstandardized regression coefficient or the strength of the relationship between the independent variable, *Breadth of Experience*

Table 7
Regression Coefficients Summary – Resilience to Terrorism

Model	Predictor Variables	Hypothesis	Unstandardized Coefficients – B	Standardized Coefficients – Beta	Sig.	Collinearity Statistics – VIF
1	Constant		-17.887		.748	
	Size of the Company		5.665	.044	.588	1.008
	Market Index		.004	.031	.701	1.008
2	Constant		-6.081		.922	
	Size of the Company		3.077	.024	.800	1.353
	Market Index		.002	.017	.851	1.190
	Terrorism Exposure	1a	4.555	.042	.673	1.483
3	Constant		-13.136		.844	
	Size of the Company		4.170	.033	.743	1.472
	Market Index		.001	.013	.887	1.215
	Terrorism Exposure	1a	4.175	.038	.702	1.503
	Breadth of Experience in High – Risk Countries	2a	55.114	.026	.763	1.144
4	Constant		-7.983		.904	
	Size of the Company		1.509	.012	.906	1.497
	Market Index		7.072E-5	.001	.995	1.223
	Terrorism Exposure	1a	12.597	.116	.294	1.841
	Breadth of Experience in High-Risk Countries	2a	60.977	.029	.737	1.144
	Time Since Last Attack Moderator	1c	7.677	.150	.103	1.256
5	Constant		-7.830		.909	
	Size of the Company		1.227	.010	.927	1.621
	Market Index		-4.439E-5	.000	.997	1.235
	Terrorism Exposure	1a	13.092	.121	.359	2.565
	Breadth of Experience in High-Risk Countries	2a	90.918	.044	.748	2.748
	Time Since Last Attack Moderator	1c	7.604	.148	.115	1.306
	BCP Exposure Moderator	1b	-.528	-.006	.959	1.797
	BCP Breadth Moderator	2b	-1.203	-.019	.888	2.614

Dependent Variable: Firm Performance Resilience *in High-Risk Countries,* and the dependent variable, *Firm Performance Resilience,* because the results of the model F-test and regression coefficient T-tests are not statistically significant.

Regrettably, none of the combinations of additional moderating variables, *Time Since Last Attack*, and *Business Continuity Plan*, in Models 4 and 5 provide a statistically significant explanation of the variance in the data.

Subsequent to our initial analysis, we conducted a post hoc statistical inquiry to further probe relationships and measures of the variables in our model. Because the data in this incident level study are dominated by the experience of four firms, as shown in Appendix A (McDonalds, N = 33; Coca-Cola, N = 12; Shell, N = 11; and Peugeot, N = 10), we independently ran correlations and regressions for each of these firms. Furthermore, we conducted the following four analyses by incrementally removing each of these firms from the full sample:

1. Full sample without McDonalds (N = 154 - 33 = 121);
2. Full sample without McDonalds and Coca-Cola (N = 154 - 33 - 12 = 109);
3. Full sample without McDonalds, Coca-Cola, and Shell (N = 154 - 33 - 12 - 11 = 98)
4. Full sample without McDonalds, Coca-Cola, Shell, and Peugeot (N = 154 - 33 - 12 - 11 - 10 = 88).

Again, we use a hierarchical linear regression framework for model comparison (Kim, 2016), adding variables to the baseline intercept model. The post hoc analysis of McDonalds (N = 33) showed a statistically significant correlation of 0.423 between the independent variable, *Terrorism Exposure*, and the dependent variable, *Firm Performance Resilience*, but the directionality is not consistent with our Hypothesis 1a. The directionality of the correlation between *Terrorism Exposure* and *Firm Performance Resilience* for Coca-Cola, Shell, and Peugeot is consistent with Hypothesis 1a but is not statistically significant. Furthermore, none of the models and individual regression coefficients in the post hoc statistical analysis has a significant F statistic, indicating that none of the models, and none of our variables, provide a better than chance account of variance in the data.

STUDY 1

DISCUSSION

Our research explores an interesting topic with a promising model and hypotheses based on the literature and practical experience. However, the current data does not provide the statistical results to support the predictions. First, the fit of the models and the regression coefficients are not significant for any of our models, limiting our ability to draw conclusions from the models. Table 8 provides a summary of the hypotheses, including the underlying literature concept and the results of the hypothesis tests.

Table 8
Hypotheses Test Summary – Resilience to Terrorism

#	Hypothesis	Underlying Concept (Reference)	Support
1a	Prior exposure of terrorism positively relates to a firm's performance resilience after a subsequent terrorist attack.	Deliberate learning (Vogus & Sutcliffe, 2007; Zollo, & Winter, 2002)	No
1b	The existence of a business continuity plan makes the relationship between terrorism exposure and firm performance resilience more positive.	Organizational preparedness (Cerullo & Cerullo, 2004; Czinkota et al., 2010; Henisz et al., 2010)	No
1c	The longer the elapsed time between a prior exposure to terrorism and a subsequent exposure, the less positive the association between terrorism exposure and firm performance resilience after a subsequent terrorist attack.	Erosion, degradation over time (Redlener & Berman, 2006)	No
2a	The firm's operating experience in high-risk environments positively relates to firm performance resilience after a terrorist attack.	Deliberate and vicarious learning (Vogus & Sutcliffe, 2007; Zollo, & Winter, 2002). Continuous risk exposure (Henisz et al., 2010)	No
2b	The existence of a business continuity plan makes the relationship between the breadth of experience operating in high-risk countries and firm performance resilience more positive.	Organizational preparedness (Cerullo & Cerullo, 2004; Czinkota et al., 2010; Henisz et al., 2010)	No

Second, contrary to Hypothesis 1a, all models indicate a negative association between the independent variable of *Terrorism Exposure* and *Firm Performance Resilience*. That is, in all five models, the data suggests that the stock price for firms with prior exposure to terrorism takes longer to bounce back after a subsequent attack than firms' without prior terrorism exposure. Our post hoc statistical probe suggests that the 33 separate terrorist incidents from McDonalds (of 154 in total) might account for this finding. In any case, a potential explanation for the lack of support for Hypothesis 1a is that the pressures associated with the sustained risk of operating in an environment where the recurring exposure to terrorism is high, offsets the organizational learning from a firm's prior exposure. That is, the ongoing stress caused by the threat-of-terrorism might offset potential adaptive learning from a specific terrorist attack – a possibility that is consistent with previous work relating the stress of terrorism risk to reductions in managerial effectiveness (Bader & Berg, 2013).

Third, the results do not show a positive relationship between resilience to terrorism and a firm's breadth of experience in coping with other types of disasters and conflict related political risk. In fact, all models seem to indicate a negative association between the independent variable, *Breadth of Experience in High-Risk Countries,* and *Firm Performance Resilience*. The sign of the unstandardized regression coefficient in all five models indicates that the stock price for firms with prior exposure to terrorism takes longer to bounce back after a subsequent attack than does the stock price associated with firms' without prior experience in high-risk countries.

Finally, the additional combinations of moderating variables, *Time Since Last Attack*, and *Business Continuity Plan*, did not provide a statistically significant explanation, suggesting that Hypothesis 1b, 1c, and 2b are not supported by the data. Although the results indicate a non-causal significant correlation between *Business Continuity Plan* and *Terrorism Exposure*, our exploratory study does not provide statistical evidence that the moderating variables of *Business Continuity Plan* and *Time Since Last Attack* influence the relationship between the two antecedents and the firm's resilience to terrorism.

Limitations and Opportunities

There are several limitations to this study. First, the relatively small number of firms affected suggests that something about these specific firms, rather than about organizational preparedness, might affect resilience to terrorism attacks. For example, the McDonalds incidents involve small franchises of a large, customer-facing firm. An attack on any one franchise location would likely have a very small impact on overall performance and could well be explained away (and so already accounted for in the stock price) by the political risk in a particular location. Our post hoc analysis did not shed light on this possibility, perhaps because, after removing the four most-affected firms, the total sample was quite small.

Second, and related to the first point, the measurement of *Firm Performance Resilience* in terms of stock price bounce back is a blunt instrument for assessing performance resilience and may not be sufficiently sensitive to less severe terrorist attacks. Similarly, it is perhaps more a measure of perception than of actual impact. Subsequent research could rectify this limitation by using performance measures that are more closely related and sensitive to terrorism, such as the firm's sales in the retail industry.

Furthermore, our measures of moderating and independent variables could be fine-tuned. Our measure of the moderating variable, *Business Continuity Plan*, only considers the existence at a point in time, not the maturity or quality of the Business Continuity Plan. Similarly, because Fortune 1000 MNEs make long-term strategic decisions concerning country operations, our study indicates the ratio measure (number of high-risk countries where the firm operates divided by the total number of countries where the firm operates) of the independent variable, *Breadth of Experience in High-Risk Countries*, does not change over time. Our ratio measure of *Breadth of Experience in High-Risk Countries* accurately represents the most recent breadth of experience for each firm, but subsequent studies could measure the breadth of experience of the firm at the time of the attack.

By meticulously collecting more mature data for all variables at the time of each terrorist incident, we may develop a quantitative working model linking prior terrorism exposure and experience with resilience. Given the complex, low-incidence, and high-impact contextual reality of terrorist attacks, however, we are not surprised such events might not lend themselves to simple quantitative models. Instead, our null findings suggest such links may not exist and what may be required to learn more about developing resilience to terrorist attacks are careful case studies (or event studies) with richer contextual depth.

Finally, our exploratory study into organizational preparedness and resilience to terrorism may suffer from not focusing on the project level where more of the preparation and effects are keenly felt. Study 2 addresses this problem by diving deeply into the operations of one large firm to examine whether and how firms translate organizational preparedness into performance.

STUDY 1

CONCLUSIONS ON RESEARCH CONTRIBUTION

Grounded in both the grave reality of terrorism and the international business literature, our research explores both the effect of terrorism on international business and conceptualizes this compelling topic into a practical model worthy of future research. While the current data does not provide statistical evidence to support the incident level predictions from the model, our exploratory research leads us to believe that the problem lies with the lack of sensitivity and maturity in our measures.

While other studies have conducted industry level and event-specific research into the relationship between terrorism and international business, we attempted an incident level conceptual model exploring the relationship between prior terrorism exposures, operational experience in high-risk locations, business continuity planning, and a firms' performance in a terrorism environment. Our work contributes to the literature on terrorism and international business by identifying and exploring a gap in the literature concerning the organizational preparedness of firms to deal with terrorism. Furthermore, this research provides a theoretical contribution concerning the role of learning and business continuity planning in responding to Vogus and Sutcliffe's call (2007) for developing a theory of organizational resilience. "Resilient organizations seem to turn traditional organization theory on its head by deploying rather than restricting the deployment of resources" (Vogus & Sutcliffe, 2007; p. 3421). A theory of organizational resilience will provide an enhanced understanding into how resilient organizations rebound from disruptions, such as terrorism, and outperform less adaptable organizations (Jain & Grosse, 2009; Vogus & Sutcliffe, 2007).

Practically, our model, along with the experience and literature that are consistent with the model, suggests that managers: prepare carefully for the eventuality of a terrorist attack; strive to avoid the attenuation of attention that may occur as time passes after an attack (on the firm on in its environs); and invest in organizational preparedness in general. Moreover, if unfortunate enough to be attacked, emphasize deliberate learning from certain situations and codify that learning into routines as well as plans (Zollo & Winter, 2002).

In summary, this research paper stimulates scholarly research into the potential for organizational preparedness solutions to improve the resilience results of international businesses struggling to cope with the worldwide crisis of terrorism. Terrorism is a phenomenon that requires contextual and operational depth and our paper seeks to test and recommend specific practices that will help firms recover more quickly from – and so be less constrained by – possible terrorist attacks. This unique exploratory incident level study into the tragic phenomena of terrorism within the international business community provides a meaningful step forward in both theory and practice in an under-developed research area worthy of additional study with intensifying business and academic implications.

STUDY 2 - SAFETY PREPAREDNESS AND PROJECT PERFORMANCE

INTRODUCTION

Our exploratory research in Study 1 emphasizes the safety, economic, and psychological implications that grow alongside the threat of terrorism to international business. Terrorism, archaic infrastructure, and civil unrest are a few of the unpredictable risks in an “extraordinarily dangerous world” (National Security Strategy of the United States of America, 2017, p. 1). Moreover, the nature of the work performed by international businesses itself is dangerous. The United States Department of Labor (US DOL) Bureau of Labor Statistics recorded 2.9 million non-fatal and 5,190 fatal work injuries in 2016 with private-industry fatalities increasing 7 percent from 2015 (US DOL, 2016a; US DOL, 2016b).

This second study extends and addresses one of the limitations in our prior exploratory research by peering below the firm to focus on the connection between daily operations, organizational preparedness, and performance. In so doing, we strive to contribute to a theory of organizational resilience by examining how organizational preparedness plans and processes, and safety preparedness, specifically business safety plans, relate to performance in a dangerous world.

In this study, we leverage practical business experience, data access, proven metrics, and executive insights to delve into the operations of a diversified and successful global business operating in dangerous contexts from military logistics to chemical weapon disarmament. Our unfettered access to internal metrics of preparedness and performance supports rich insights into the actual operations of a firm. At the same time, the sheer scale of the firm and diversity of project types yields enough variability in practice and results to allow statistical analysis of the impact of specific processes. In the end, our research reveals how a culture of safety combines with safety plans to affect both safety and business performance at a project level. In particular, we show that a combination of plans and culture improves customers' rating of project performance while a robust culture of safety improves project financial performance. These findings have implications for both the practice and theory of developing resilience to danger.

The next section of this second study provides a review of the literature concerning safety preparedness, safety performance, and business performance. We then offer a conceptual model and articulate hypotheses concerning the relationships between safety performance, safety preparedness, and project performance. Subsequently, we describe the data, variables, and analytic approach taken to evaluate these relationships. Finally, we report results, discuss limitations, and identify the academic and practical implications of these findings.

STUDY 2

LITERATURE REVIEW

Our prior research in Study 1 reveals firms organizationally prepare to perform in the face of future unplanned discontinuities such as terrorism, but this research did not examine how firms prepare to perform given danger within their own walls. For this study, we dig further into the literature investigating the relationships between safety preparedness (a practical application of organizational preparedness), safety performance, and business performance.

International business and human resource management journals provide a body of literature addressing the linkage between safety preparedness and business performance. Moreover, occupational safety, health, and environmental journals provide targeted literature linking safety performance to organizational performance and categorizing the concept of safety preparedness into two key constructs: the culture of safety (Clarke, 2006; Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2007a; Griffin & Neal, 2000) and the safety plan (Bottani, Monica, & Vignaili, 2009; Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2007b; Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2009; Reiman & Pietikäinen, 2012). Therefore, we review four literature stream connections:

1. Safety and Terrorism Preparedness;
2. Culture of Safety and Business Performance;
3. Safety Plan and Business Performance;
4. Safety Performance and Business Performance.

First, building from Study 1 we review the literature connecting safety and terrorism preparedness. The events of 9/11 tragically coupled workplace safety concerns and terrorism (Bader & Berg, 2013; Schuster et al., 2001). According to the 2005 Society and Human Resources Trends Report, "terrorism, safety, and security top the agenda for many multinational organizations" (Lockwood & SPHR, 2005, p. 8). Moreover, Czinkota et al.'s (2010) highly referenced research agenda on terrorism and international business highlights that resilient firms develop processes, procedures, and systems to enhance organizational preparedness for all manner of disruptions (Branzei & Abdelnour, 2010). For their part, Bader and Berg (2013) demonstrate how terrorism-induced safety concerns affect the performance of expatriates. From a tourism industry perspective, Paraskevas and Arendell (2007) emphasize the importance of safety measures in a strategic framework for mitigating the risk of terrorism at tourist destinations, which are soft targets for terrorists. Undoubtedly, the literature indicates whether you are a tourist, employee or senior executive, there is a strong linkage between safety and terrorism.

A second stream of literature from psychology and safety journals probes the relationship between a culture of safety and business performance. Fernández-Muñiz and colleagues characterizes a culture of safety as an antecedent to safety performance (Fernández-Muñiz et al., 2007b). Consistent with Fernández-Muñiz (2007a; 2007b; & 2009), Griffin and Neal (2000) develop a framework for measuring perceptions of safety at work and conclude that safety culture is an antecedent to safety performance. Similarly, Barling, Loughlin and Kelloway (2002) use structural equation modeling to provide strong support for a conceptual model linking safety culture to safety performance. Finally, Clarke's (2006) meta-analysis found support for a hypothesis linking organizational safety culture and safety performance from both a participation and conformance perspective. Clearly, a culture of safety has emerged as a fundamental aspect of an organization's ability to reduce work related injuries (Fernández-Muñiz et al., 2007a; Fernández-Muñiz et al., 2007b) and improve safety performance.

A third stream of literature links the organizational processes and systems for managing safety to the safety performance of the organization. As a result of evolving technology, competitive pressures, changing working environments, and increasing regulations, firms have adopted increasingly refined safety management processes to "keep pace with new hazards" (Bottani et al., 2009; p.155) and mitigate operational risks. The literature recognizes the implementation of a holistic safety management process, not only as an effective means of allocating resources to safety preparedness (Fernández-Muñiz et al., 2007b) but also as a driver of safety performance results (Reiman & Pietikäinen, 2012). For example, Bottani et al.'s (2009) used confirmatory factor analysis of a survey of 116 firms to provide evidence that adopters of a safety management process exhibit significantly higher safety performance than non-adopters. Likewise, another study of 138 organizations by Zacharatos, Barling, and Iverson (2005) shows that execution of high performance workplace safety processes positively relates to the safety performance of the organization. Moreover, a comprehensive study by Fernández-Muñiz et al. (2009) of 3,820 randomly selected national and international firms, located in Spain, from the construction, industrial, and service sectors found statistically significant support ($B = 0.47$, $p < 0.05$) for a hypothesis linking safety management process to safety performance. From a practical perspective, the literature also shows that the implementation of a safety plan framework motivates safety performance by providing an adaptable set of leading and lagging indicators for measuring safety results (Reiman & Pietikäinen, 2012).

A fourth stream of literature examines the association between safety performance (i.e. reduced workplace injuries and fewer lost workdays) and operational and economic performance. Academic research linking the performance of a safety program and firm performance primarily focuses on two key aspects of firm performance: economic-financial efficiency and the quality of service provided (Fernández-Muñiz et al., 2009; Mossink & de Greef, 2002).

Safety performance can also tangibly increase worker efficiency (Fernández-Muñiz et al., 2009; Lamm, Massey, & Perry, 2007; Shikdar & Sawaqed, 2003), thereby enhancing economic and financial results at both the project and firm levels (Fernández-Muñiz et al., 2009; Klassen & McLaughlin, 1996). Shikdar and Sawaqed's (2003) survey of 50 production managers from four industries concluded that firms with higher environmental and safety-related "problems had more performance related problems such as low productivity, and higher absenteeism" (p. 569 – 570). More positively, Lamm et al.'s (2007) literature review concludes that effective safety programs can reduce worker productivity losses, although conclusive empirical data is lacking. Adopting a more holistic approach, O'Donnell (2000) and Klassen and McLaughlin (1996) link safety results to firm profitability. Likewise, Fernández-Muñiz et al.'s (2009) study of foreign and national firms in Spain, not only found strong support connecting safety plans to safety performance, but also found statistically significant support ($B = 0.35$, $p < 0.05$) for a direct, positive association between having a safety management system and economic performance at the firm level. While encouraging at the firm level, none of these studies provide strong support for an association between safety plans (which operate at the project level) and project level economic performance.

Looking within the organization, in which safety and quality management systems have been shown to be closely coupled (Klassen & McLaughlin, 1996; Shikdar & Sawaqed, 2003), the literature asserts that safety performance not only enhances the quantity of production, but also increases the quality of service (Fernández-Muñiz et al., 2009; Shikdar & Sawaqed, 2003).

Specifically, safety performance seems to generate firm value by increasing employee morale, service delivery, social responsibility (Klassen & McLaughlin, 1996), branding, and innovative capacity (Fernández-Muñiz et al., 2009). Further, Mossink and de Greef (2002) suggest that accident prevention has more unintended positive benefits (economic efficiency and quality) on company performance, than can be accounted for by reductions in accidents and absenteeism. In other words, enhancing safety performance seems to increase business performance by improving quality, morale, and culture within the firm (Fernández-Muñiz et al., 2009; Shikdar & Sawaqed, 2003).

Table 9 summarizes the relationships between safety culture, safety plans, safety performance, and firm performance. Missing from the literature are the antecedents and consequences of safety preparedness at the project level. This is an important omission because safety is fundamentally an operational factor that varies within firms and so is most appropriately studied and measured at the project, not the firm level (Griffin & Neal, 2000).

Table 9
Summary of Safety and Performance Conceptual Models

Antecedents	Moderating Construct	Unit of Analysis	Consequences	Reference
Safety Initiatives	Safety Performance	Firm	Firm Performance	Mossink & de Greef, 2002
Organizational Culture Health Management	Productivity	Firm	Profit	O'Donnel, 2000
Culture of Safety	Knowledge and Skill Motivation	Firm	Safety Performance	Griffin & Neal, 2000
Environmental Management	Environmental Performance	Firm	Financial Performance	Klassen & McLaughlin, 1996
Managers Committment	Safety Management System Employees Involvment	Firm	Safety Performance	Fernández-Muñiz et al., 2007a
Transformational Leadership	Culture of Safety	Employee	Safety Performance	Barling et al., 2002 Fernández-Muñiz et al., 2009

A second gap in the literature concerning safety and performance has to do with the client's assessment of performance. Although academics, company executives, and shareholders view profitability as a key measure of performance, customers view the quality of service as the principal measure of performance. A unique aspect of our study is to link safety and performance not only to financial results, but also to the quality of service provided from the objective perspective of the client.

STUDY 2

CONCEPTUAL MODEL AND HYPOTHESES

Building upon the literature review and the associated models in the literature (see Table 9) connecting safety and performance within a firm, we draw a conceptual model (Figure 6) depicting the relationships between safety preparedness, including both safety culture and safety plans and processes, safety performance, and project performance.

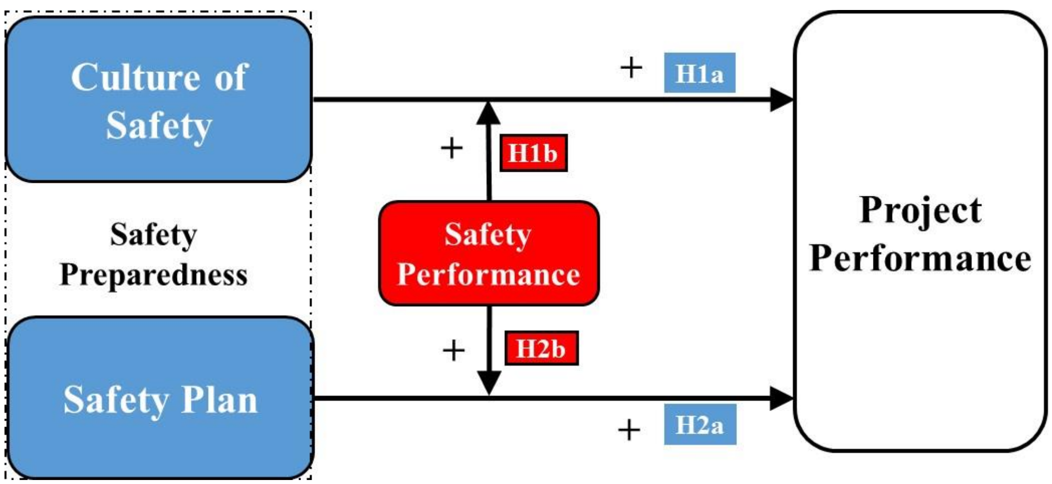

Figure 6 – Safety Preparedness and Performance Model

Safety Preparedness is the ability to prepare an organization in advance to keep its workforce safe. We operationalize *Safety Preparedness* using the constructs of a *Culture of Safety* and *Safety Plan*. Grounded in our review of the literature, we define a *Culture of Safety* as the underlying accident prevention environment, woven into the fabric of the organization that prioritizes attention to worker safety (Clarke, 2006; Fernández-Muñiz et al., 2009). We define the *Safety Plan* as the existence and maturity of comprehensive organizational control systems for producing safety (Fernández-Muñiz et al., 2007b; Reiman, & Pietikäinen, 2012). We postulate that, separately and together, a *Culture of Safety* and the existence and completeness of a *Safety Plan* will directly stimulate *Project Performance*. Next, our model suggests that *Safety Performance* moderates the relationships between both the *Culture of Safety* and *Safety Plan* and the overall *Project Performance*. In other words, we posit an indirect effect between *Safety Performance* and the outcome of *Project Performance*.

To test this model, we develop two sets of hypotheses that detail operationalized and testable associations between the two attributes of *Safety Preparedness* (1 - *Culture of Safety* and 2 - *Safety Plan*), the indirect effect of *Safety Performance*, and *Project Performance*. The first set of hypotheses describes relationships between the *Culture of Safety* and *Project Performance*. The second set of hypotheses articulates an association between the existence and completeness of a *Safety Plan* and *Project Performance*. To operationalize the constructs, we focus on projects, that is discrete and measurable programs executed for a customer under a written contract.

Hypotheses 1: Culture of Safety and Project Performance

The first set of hypotheses proposes that safety preparedness operationalized as a *Culture of Safety*, directly enhances *Project Performance* and *Safety Performance* strengthens this relationship.

Based on experience and the literature, we expect projects with a stronger *Culture of Safety* will outperform less prepared projects. In other words, we posit that client projects with a strong underlying and institutionalized (Clarke, 2006; Fernández-Muñiz et al., 2009) *Culture of Safety* will produce better overall performance results than client projects with a weaker *Culture of Safety*.

Hypothesis 1a - *The Culture of Safety on a project positively relates to Project Performance.*

Furthermore, the literature suggests that *Safety Performance* amplifies the association between a *Culture of Safety* and *Project Performance* by enhancing the quality of service delivered (Fernández-Muñiz et al., 2009; Shikdar & Sawaqed, 2003). A strong *Culture of Safety* coupled with a positive *Safety Performance* should improve the overall project performance by increasing employee morale, service delivery, social responsibility (Klassen & McLaughlin, 1996), and innovative capacity (Fernández-Muñiz et al., 2009). That is, we expect *Safety Performance* to serve as a positive moderator of the relationship between *Culture of Safety* and *Project Performance*.

Hypothesis 1b - *The Safety Performance on a project makes the relationship between Culture of Safety and Project Performance more positive.*

Hypotheses 2: Safety Plan and Project Performance

The second set of hypotheses proposes that safety preparedness, operationalized as the existence and maturity of a *Safety Plan*, directly enhances *Project Performance* and again, that *Safety Performance* amplifies this relationship.

We anticipate that client projects with comprehensive organizational control systems for producing safety (Fernández-Muñiz et al., 2007b; Reiman, & Pietikäinen, 2012), denoted as a *Safety Plan*, will produce better safety results than client projects without effective control systems for producing safety.

Hypothesis 2a *– The Safety Plan on a project positively relates to Project Performance.*

Further, professional experience and academic research indicate that *Safety Performance* positively moderates the linkage between the existence and thoroughness of a *Safety Plan* and *Project Performance*. A mature *Safety Plan* augmented with strong *Safety Performance* increases worker productivity (Fernández-Muñiz et al., 2009; Lamm et al., 2007; Shikdar & Sawaqed, 2003), and thereby enhances *Project Performance* (Fernández-Muñiz et al., 2009; Klassen & McLaughlin, 1996).

Hypothesis 2b - *The Safety Performance on a project makes the relationship between Safety Plan and Project Performance more positive.*

In the next section, we discuss the research method including the data, measurements, data sources, and the data analysis used to test these hypotheses.

STUDY 2

METHOD: DATA, VARIABLES, AND DATA ANALYSIS

To test these hypotheses, we conduct an empirical study of the relationships between safety preparedness, safety performance, and project performance using secondary data collected from a Fortune 500 firm with global operations in over 140 countries. By using data from one firm, we hold constant the effects of industry and firm level factors; this allows us to focus on the effect of project level variation on performance.

Data

To study project level variation and performance, we use safety and project performance data for 33 projects conducted from 2014 to 2017 in a $1.7B Strategic Business Unit (SBU) of AECOM. The availability of the safety and performance data reduced the quantity of projects studied. For example, we select projects where AECOM is the prime contractor vice a subcontractor because the vast majority of the SBU portfolio is prime contracts. In addition, a unique aspect of our study is the use of client performance data to measure project performance and this client performance data is only available on prime contracts. The projects studied and SBU provide testing, logistics, and maintenance services at U.S. Government facilities and military installations within and outside the continental U.S. These services are performed by AECOM as the prime contractor for U.S. Department of Defense and Civilian agencies, including the Army, Navy, Air Force, National Aeronautical Space Administration, and the Department of Treasury under the aegis of competitively awarded Federal contracts. The projects include such diverse efforts as asset forfeit seizures, hazardous material management, rotary wing flight operations as well as maintaining and sustaining ground and air vehicles in dangerous locations outside the U.S. As such, the 33 projects are distinct and vary in complexity and risk profile while fully representing the size, scope, complexity, and geographical span of the SBU. In all cases, the projects are large enough in size and scope, that each has its own team of leaders and workers; further, the projects run for long enough periods that they develop their own performance profile and culture. Finally, although the umbrella contract vehicle often lasts for several years, the project evaluation period is usually the government fiscal year.

The safety preparedness and safety performance data used in this study are leading and lagging statistics collected on a monthly basis and maintained in an Excel database by a project-independent team of safety professionals. The safety professionals define the terms and measures in accordance with a corporate safety policy. The safety team also develops standardized templates to collect the safety performance data from project sites for each of the leading and lagging indicators and then aggregates the data at the project level on a monthly basis. The safety information collected consists of counts, such as the number of safety observations or the number of personnel safety certifications by project, and compliance scores derived from dichotomous (yes/no) results to a standardized set of questions, tabulated into a monthly percentage score.

The project performance data include both project financial performance metrics and performance assessment data from clients. The financial metrics are internal company revenue (sales) and profits earned which are collected in a Deltek Costpoint Enterprise

Resource Planning accounting software for government contractors, and audited by the U.S. Defense Contracting Management Agency. The financial performance data is extracted into Excel workbooks monthly from the Costpoint accounting software.

We draw the clients' assessment of operational performance from the U.S. Federal Government Contractor Performance Assessment Report System (CPARS) database (CPARS, 2017). The government Contracting Officer's Representative (COR) enters the data and evaluates performance during a given reporting period across four different performance areas: 1) quality of service; 2) ability to control costs; 3) management effectiveness; and 4) adherence to schedule. For each area, the COR uses the five-point scale summarized in Table 10, and supports each rating with a narrative and evidence (CPARS, 2017). The CPAR evaluation period is typically one year in length, corresponding to the government fiscal year. The contractor may review all CPARS data, but the government has final approval of the CPAR. Furthermore, the CPAR is only accessible by U.S. Government personnel and the prime contractor performing the work.

Table 10
Contractor Performance Assessment Reporting System – Definitions

Adjective Evaluation Rating	Definition	Assigned Numeric Score
Outstanding	Exceeds many requirements	4
Very Good	Exceeds some requirements	3
Satisfactory	Meets all requirements	2
Marginal	Does not meet some requirements	1
Unsatisfactory	Does not meet most requirements	0

Importantly, the CPARS database is the U.S. Federal Government's primary source for evaluating a contractor's past performance in proposals for future contracts. Moreover, past performance, along with technical capability and price, are the major evaluation criteria factors used by U.S. Federal agencies for awarding contracts in a fiercely competitive environment. Consequently, U.S. Federal contractors place a premium on the performance information in the CPARS database.

Variables

Table 11 summarizes the name, type, description, measurement, and data source for each of the independent, moderating, control, and dependent variables used in our study. We ground the measurements in the literature with industry accepted and U.S. Federal endorsed project and safety performance metrics. For example, we draw the leading and lagging indicators of safety from the U.S Department of Labor Occupational Safety Health Administration (OSHA, 2017).

To begin with, *Project Performance* is the dependent variable. We measure *Project Performance* as both the internal financial and external operational performance on the project. We use the same periods for both measures. First, we measure financial performance as the profit margin generated by the project. The profit margin equates to the earnings before interest, taxes, and amortization (EBITA) during the period of performance divided by the revenue during the same period. Second, we measure operational performance by extracting the client's assessment of the contractor's performance from a U.S. Federal CPARS database in the evaluation areas of quality, cost

Table 11
Description of Variables in the Safety Preparedness Conceptual Model

Name	Type	Description	Measurement	Data Source
Project Performance	DV	External rating of project operational performance from a quality, schedule, cost control and management perspective	Client operational performance assessment from 6 month or annual period on a 5 point scale; Outstanding, Good, Acceptable, Marginal, Unacceptable	U.S. Federal Government CPARS database
		Project level financial performance	Project profit margin – project EBITA during the period of performance divided by revenue during the same period	Project level financial results extracted from a Deltek Costpoint System
Culture of Safety	IVs	Accident prevention environment instituted in the organizational fabric for sustaining a safe working place (Fernández-Muñiz et al., 2009)	Annualized # of safety management observations	Project level safety indicators and results extracted from the safety teams data (Excel database)
			Annualized # of personnel safety certifications	
Safety Plan		Existence and completeness of organizational control systems for producing safety (Fernández-Muñiz et al., 2007b; Reiman, & Pietikäinen, 2012).	Percentage score on dichotomous (yes/no) questions on system safety audit	
			Percentage score on dichotomous (yes/no) safety inspection questions	
Safety Performance	Moderator	Reduction of injuries and accidents (Fernández-Muñiz et al., 2009; Griffin, & Neal, 2000).	Recordable injury rate number of recordable cases multiplied by 200,000 and then divided by the number of labor hours worked on the project.	
			Annualized number of near misses	
Risk Exposure	Control	Degree of danger and hazards posed in the working environment	Hours worked in performance of duties of a higher inherent risk divided by total hours worked	Duties Test of the Fair Labor Standards Act (2017)
Project Size		# of labor hours worked by employees on a project	Annualized hours worked	Project level data extracted from Costpoint database

control, management, and schedule during the period. We assign a numeric score (0 to 4) to the adjective evaluation ratings, as shown in Table 10, for each of the four performance areas. Because the CPARS adjective evaluation ratings are interval scale data, similar to a Grade Point Average, we average the numeric scores across the four different evaluation areas for each project during the government specified evaluation period, which again is commonly one year.

Next, the two independent variables in the model are the *Culture of Safety* and the existence of completeness of a *Safety Plan*.

The independent variable, *Culture of Safety*, reflects the accident prevent environment institutionalized in the project for promoting a safe working place (Fernández-Muñiz, Montes-Peón, & Vázquez-Ordás, 2009). We adopt two working environment-focused indicators as measures of the *Culture of Safety* on a project: 1) number of safety management observations and 2) number of personnel safety certifications. Safety management observation is a technique whereby co-workers observe each other and provide constructive one-on-one feedback to reinforce safe work behaviors and discourage at-risk behaviors, aided by observation checklists. Observation checklists, in accordance with corporate Behavior-Based Safety Policy (AECOM, 2016), are used to identify both safe and at-risk behaviors and why each behavior occurred. In our experience, some project teams use safety management observations more often, and take them more seriously, than others. Therefore, we expect a higher number of safety management observations to correlate to a stronger culture of safety, controlling for the size of the project. The personnel safety certifications measure is a count of the number of managers on the project who have obtained an accredited Safety Trained Supervisor (STS) certification, sponsored by the Board of Certified Safety Professionals. To obtain an STS certification, a manager must have the prerequisite education and work experience, and having fulfilled those requirements must pass a computer-delivered examination. We expect project teams with a higher proportion of managers with such certifications to have a stronger culture of safety.

The independent variable, *Safety Plan,* is the presence and completeness of organizational control systems for producing safety (Fernández-Muñiz et al., 2007b; Reiman, & Pietikäinen, 2012). To measure the *Safety Plan,* we employ two process-focused indicators, system safety audits and safety inspections. The safety team, independent of project management team, oversees the system safety audit. The audit consists of dichotomous (yes/no) responses to a standardized set of questions concerning the existence and extent of a system safety plan for the project. Sample monthly audit questions include:

- Did the project complete the required Task Hazard Assessments for their work activities?
- Did the project review all required emergency plans to ensure they are implemented and employees are in a state of readiness for execution if necessary?
- Did the project complete and document all required safety training?

The result of the system safety audit is a monthly percentage compliance score, which equates to the sum of the “yes” answers divided by the total number of audit questions. Supporting the practical application of safety audits, the literature (Reiman & Pietikäinen, 2012) emphasizes the use of safety audits, including hazards assessments, as a leading indicator of system safety. In addition to the monthly safety audit, there are monthly safety inspections. The project team conducts the self-inspections of work sites. The outcome of the safety inspections is a percentage compliance score with the safety plan, with the aim of 80 percent compliance or better.

The moderating variable is *Safety Performance,* measured by safety results. We use two industry accepted and U.S Department of Labor endorsed metrics: 1) recordable injury rate (Occupational Safety and Health Administration [OHSA], 2017) and 2) the more sensitive, “near misses”. The OSHA recordable injury rate or incident rate is the number of recordable cases multiplied by 200,000 and then divided by the number of labor hours worked on the project. In order for an injury or illness to be recordable, it must be work-related. Moreover, a recordable injury under OSHA is one that causes “death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness” (OHSA, 2017, para. 1904.7(a)). The recordable injury rate provides OSHA with a standardized method of measuring a company’s performance both historically and in comparison to other companies within its industry (OHSA, 2017).

Although the recordable injury rate includes historical comparison across large firms, it remains a blunt instrument for measuring safety performance at the project level. Most projects do not encounter recordable injuries, let alone lost workdays. Consequently, we also use a more sensitive measure of safety performance called near misses. We define near misses as any unplanned event involving interaction or contact with a hazard, but resulting in no negative outcome – that is, any event that had the potential to cause injury, compromise health, impair the environmental, interrupt business, or damage property – but did not (AECOM, 2016). The project team documents and reports the recordable injury rate and near misses metrics to the safety organization, which also periodically audits the project to ensure reporting accuracy.

For all the independent and moderating variables, we ensure temporal consistency of measures with the financial and CPARS measure of the dependent variable. Likewise, we standardize the measurement of the independent variables across all projects by annualizing the number of safety observations and certifications.

Last of all, we add two variables to control for factors that might also affect the relationships in our model. *Risk Exposure* is a control variable measured as a fraction of the number of hours worked on duties of a high innate risk divided by the total number of hours worked on the project. We define high-risk projects as those where the exposure to hazards, risks, dangers, and injuries is inherently increased due to the nature of the duties performed by the majority of employees on the project. For example, the injury risk exposure of a craftsperson working at a construction site is higher than injury risk exposure of a professional web designer working from home. The "duties test" from the U.S. Fair Labor Standards Act (FLSA, 2017) categorizes employees as either craftsperson or professionals based on duties performed. Because the injury risk exposure of a craftsperson employee is fundamentally higher than the injury risk exposure of a professional employee, we adopt the U.S. Fair Labor Standards Act (FLSA, 2017) as a credible proxy for differentiating a higher risk from a lower risk project.

The *Project Size* variable controls for the magnitude of the project. We measure *Project Size* using the total hours worked by all employees on the project. Figure 7 again displays our conceptual model, but with the accompanying variable measures described above.

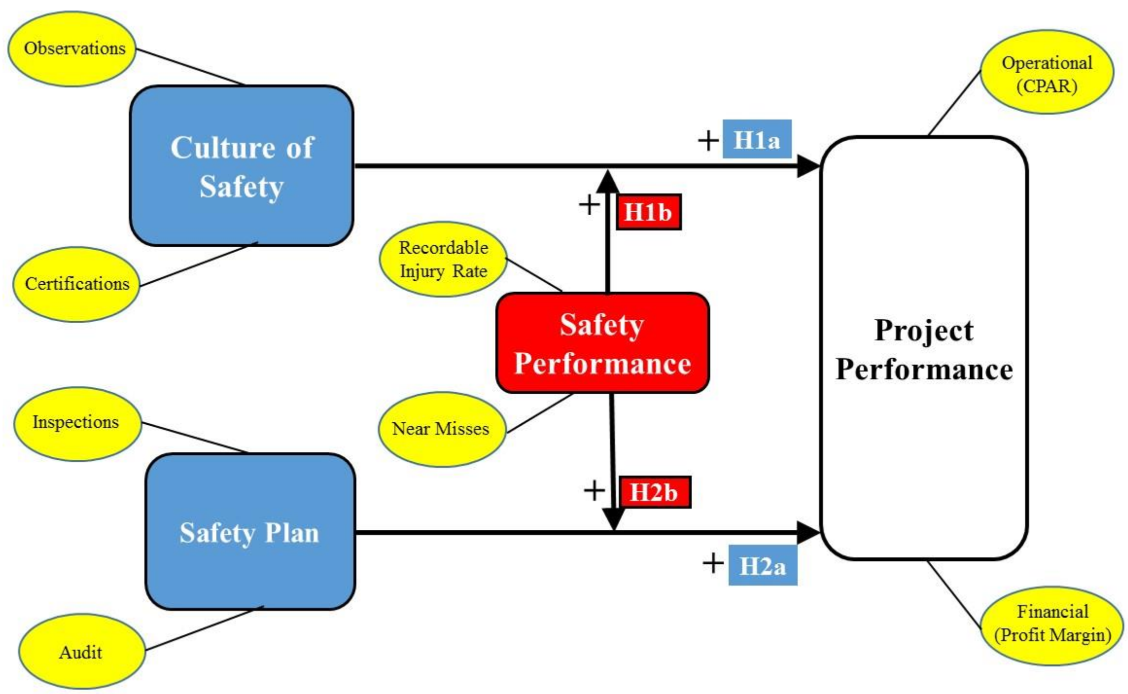

Figure 7 - Safety Preparedness and Project Performance Model with Measures

Data Analysis

We used linear regression for model and hypothesis testing and SPSS, version 23, to run all tests. To begin, we tested for the assumptions of linear regression, including linearity, multicollinearity, homoscedasticity, and normality. We computed and analyzed the descriptive statistics for all variables, including the skewness and kurtosis statistic as well as the standard error (see Appendix C). If the skewness and kurtosis statistic divided by the skewness and kurtosis standard error was greater than plus or minus 1.96, it indicated the data was not normally distributed (Rose et al., 2014). Furthermore, we plotted frequency histograms of the independent, moderating, and control variables, along with an overlay of the normal curve, visually assessing whether the variables followed distributions appropriate to our linear regression analysis.

Based on the skewness and kurtosis tests, as well as the histogram plots, we transformed the data for the variables not normally distributed such that the new transformed data was normally distributed and less skewed. As a result of the these tests and histogram plots, we transformed: the *Certifications* and *Observations* measures of the independent variable, *Culture of Safety*; the *Audi*t and *Inspections* measures of the independent variable, *Safety Plan;* the *Recordable Injury Rate* and *Near Misses* measures of the moderating variable, *Safety Performance;* and the *Profit Margin* measure of the dependent variable, *Project Performance*. Specifically, the *Audit* and *Inspections* measures of the independent variable, *Safety Plan,* contain data skewed to the right. For these two measures, we subtracted the results from the maximum and used a log transformation to approximate a normal distribution. While improving the behavior of the variable, these procedures did reverse the sign of the *Audit* and *Inspections* measures. We applied the “Lg10” function under the “Transform/Compute Variable” menu of IBM’s SPSS to conduct the variable transformations.

After the transformations, we computed new kurtosis and skewness statistics (see Appendix C) and plotted new histograms for all variables to verify normality. All the transformations reduced the skewness statistic divided by the standard error below the 1.96 threshold (Rose et al., 2014), except the *Recordable Injury Rate* measure of the moderating variable, *Safety Performance*. The *Recordable Injury Rate* measure was less, but still skewed (statistic/standard error after the transformation of 2.661 and 3.097 before transformation) due to the high frequency of projects with low injury rates. As part of our additional tests, we created a scatter plot of the standardized residual (y-axis) versus standardized predicted value (x-axis) for the dependent variable; the scatter plot of the residuals took a rectangular shape, validating homoscedasticity, or the consistency of the variance. We also analyzed collinearity statistics, including the Tolerance and VIF (1/Tolerance), from the regression output coefficients table, to detect any overlap or similarity between the explanatory variables. Encouragingly, the VIF results were below 4.0 (Simon, 2004), indicating that multi-collinearity was not an issue.

Applying both the standardized residual and interquartile range method, we performed an outlier analysis of the dependent variable. In our two-prong outlier analysis, we analyzed:

- Standardized residuals in the regression Casewise Diagnostics table;
- Histogram chart with frequency (y-axis) versus standardized residual (x-axis);

- Cumulative probability plot with expected versus observed (Figure 8);
- Scatter plot of the standardized residual versus standardized predicted value;
- Stem and leaf plots to identify from the interquartile range (difference between 75 and 25 percentiles) outlier analysis procedure.

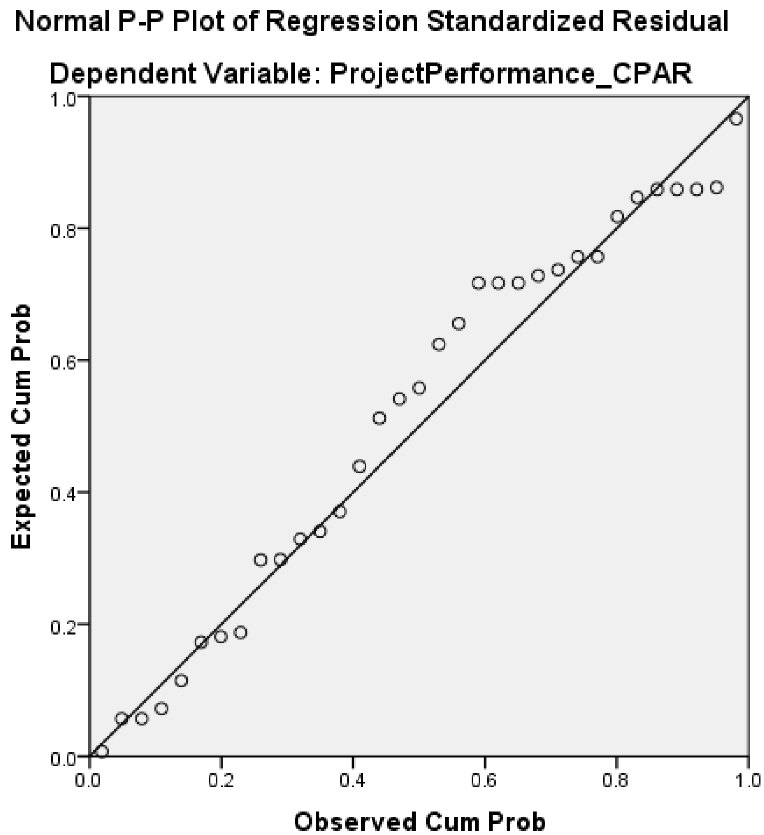

Figure 8 – Normal Probability Plot of Regression Standardized Residual

The highest standardized residual was only 2.6, which is below the accepted standardized residual for an outlier of 3.0 or greater. As an outcome of two-part outlier analysis, we did not detect any outliers and did not remove any data points from our sample size of 33.

After addressing the assumptions of linear regression and outlier analysis, we ran a correlation analysis between the operationalized independent variables, moderating variables, and the dependent variable. The correlation analysis checks for collinearity and begins to identify and evaluate the statistical significance of non-causal associations and strengths of relationships between variables. See Appendix D for the correlation results. Since the correlations showed non-causal associations between the two measures (*Observations* and *Certifications*) of the independent variable, *Culture of Safety,* and the two measurers (*Audit* and *Inspections*) of the independent variable, *Safety Plan*, we conducted factor analysis. Specifically, we sought to determine whether the characteristics of these four measures load into two distinct factors.

The factor analysis exceeded the prerequisite Kasier-Meyer-Okin (0.539) sampling adequacy and the Bartlett's statistical significance test (Bartlett, 1950), as shown in Appendix E. The rotated component matrix (see Appendix E) and the associated graph, shown in Figure 9, confirmed that the *Observations* (Component 1 = 0.867) and *Certifications* (Component 1 = 0.914) measures highly load into one factor, defined as the *Culture of Safety* independent variable. Further, the *Audit* (Component 2 = 0.749) and *Inspections* (Component 2 = 0.893) measures highly load into a second factor, defined as the *Safety Plan* independent variable.

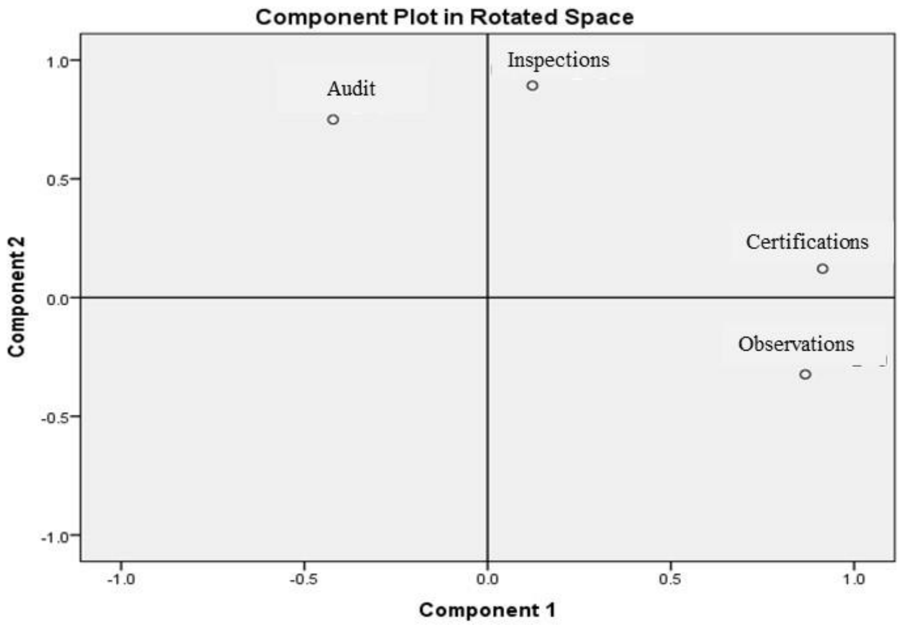

Figure 9 – Safety Preparedness Factor Analysis Plot

Having satisfied ourselves that the data and variables met relevant statistical criteria, we conducted an overall test of the statistical significance of the conceptual model using the ANOVA and Fisher (F) test in linear regression. To perform the analysis, the four hypotheses translate into four paths for linear regression analysis. The four paths, shown below, represent the relationships between the independent, moderating, and the dependent variables used in the linear regression, which determine whether the set of independent variables predict the dependent variable.

Hypothesis	Paths
1a	$PP \sim a_1 + b_1CS$
1b	$PP \sim a_2 + b_2(CS \times SPF)$
2a	$PP \sim a_3 + b_3SP$
2b	$PP \sim a_4 + b_4(SP \times SPF)$

Abbreviations
PP = *Project Performance*, Dependent Variable
CS = *Culture of Safety*, Independent Variable
SP = *Safety Plan*, Independent Variable
SPF = *Safety Performance*, Moderating Variable
a_i = constant; b_i = regression coefficient

To produce the moderation effect in Hypothesis 1b and 2b, we standardized the scale variables to mitigate multi-collinearity issues between the moderating product term and the independent variables in the regression. We then multiplied each independent variable (CS, SP) by the corresponding moderating variable (SPF) to create the two product moderating terms (CS x SPF and SP x SPF).

Subsequently, we conducted post hoc statistical probing of the interactions, including further regression analysis and scatter plots similar to the approach by Aiken, West, and Reno (1991). To understand the meaning of the moderator, we probed how the strength of the relationship between the independent and the dependent variable changes as a function of the moderator (Aiken et al., 1991). We ran regression models in SPSS adding the moderator to the independent variables. We then analyzed the "Change Statistics" in the Model Summary showing the statistical significance and the "R Square Change" of the moderator, which is the percentage increase in the variance explained by the addition of the moderator. In addition, we sorted and split the moderating variable into groups and analyzed the slopes of the simple regression lines for each group in a scatterplot with the dependent variable in the y-axis and the dependent variable in the x-axis. To verify our analysis, we studied the bivariate Pearson correlation coefficient and associated statistical significance of the correlation for each group of the moderating variable with the dependent and independent variable.

Finally, we tested the hypotheses using linear regression analysis by assessing directionality, statistical significance, and the strength of the relationships. Likewise, the sign of the unstandardized regression coefficient (B) in the regression paths tests the directionality posited in the hypotheses. We assessed statistical significance at multiple levels for each predictor variable in the regression using T-tests. Furthermore, we again evaluated the strength of the relationship by analyzing the standardized regression coefficient (Beta). We describe the results in the next section.

STUDY 2

RESULTS

Our results summarize the correlation analysis, as well as describe the process for presenting and analyzing the model and hypothesis testing. To begin, the Pearson correlation coefficients in Appendix D show statistically significant high correlations between measures of the same variable, consistent with convergent validity (Bhattacherjee, 2012). For example, the two measures (*CPARS* and *Profit Margin*) of the dependent variable, *Project Performance,* have a statistically significant Pearson correlation coefficient of 0.350. Likewise, the two measures (*Observations* and *Certifications*) of the independent variable, *Culture of Safety*, and our two measures (*Audit* and *Inspections*) of the independent variable, *Safety Plan,* have statistically significant Pearson correlation coefficients of 0.650 and 0.415, respectively. In addition, both measures (*Recordable Injury Rate* and *Near Misses*) of the moderating variable, *Safety Performance,* show convergent validity with a statistically significant Pearson correlation coefficient of 0.504.

We apply a hierarchical linear regression framework (Kim, 2016) reinforced with model and regression coefficient tables and figures. Although hierarchal linear regression "is a framework for model comparison" and not a statistical approach (Kim, 2016, para. 1), the hierarchical linear regression framework fosters a robust comparison of models and hypothesis testing. We build up Models #1 through #4, applying the hierarchical linear regression framework using the standard "Enter" method in SPSS, and then test our findings by entering all independent and moderating variables into the SPSS regression and use the “Backward” elimination method to identify the most optimal model (#5).

Specifically, we build up regression models by incrementally adding variables to the previous model (Kim, 2016), as described and displayed in Tables 12 (model summary) and 13 (coefficients summary). We start with a baseline model (#1), which includes the constant and controls. We add each independent variable to the previous models, creating Models #2 and #3. Thereafter, we add the moderating variable, generating Model #4, which represents our conceptual model. Next, we include the best-fit model (#5) from the “Backward” elimination method. Because Model #5 is the most optimal model from a statistical significance and explanation of variance (Adjusted R Square) aspect, we analyze, but do not show other models produced from the “Backward” method as they also overlap with Models #1 through #4.

We repeat this methodical process twice, once using the financial measure (*Profit Margin*) of the dependent variable and once using the customer rating measure (*Operational - CPARS)* of the dependent variable.

Project Performance *(Operational - CPARS)*

For the operational measure (*CPARS*) of the dependent variable, *Project Performance*, Table 12 shows the amount of variance explained (R Square) by the predictor variables, the amount of variance explained adjusted for number of predictor variables (Adjusted R Square), the change in variance from the prior model (R Square Change), and the statistical significance (Sig.) of the model F-test. The F-tests for Models #3 and #5 are statistically significant at the 0.05 level. The highest Adjusted R-Square value is 0.440 in Model #5, meaning the predictor variables explain 44 percent of variance in the dependent variable, *Project Performance*.

Table 12
Model and ANOVA Summary – Safety Preparedness and Project Performance *(Operational - CPARS)*

Model	SPSS Regression Method –	Variable Name *(Measure)*	R Square	Adjusted R Square	F	Sig.
1	Enter	Constant, Project Size, Risk Exposure	.015	-.051	.225	.800
2	Enter	Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations)*	.092	-.038	.706	.594
3	**Enter**	**Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations)*, Safety Plan *(Inspections, Audit)***	**.441**	**.312**	**3.418**	**.013**
4	Enter	Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations)*, Safety Plan *(Inspections, Audit)*, Safety Performance *(Injury_Audit_Moderator, Miss_Inspection_Moderator, Miss_Certification_Moderator, Injury_Certification_Moderator, Injury_Inspection_Moderator, Miss_Observation_Moderator, Injury_Observation_Moderator, Miss_Audit_Moderator)*	.603	.294	1.952	.091
5	**Backward Step Wise**	**Constant, Culture of Safety *(Certifications)*, Safety Plan *(Inspections)*, Safety Performance *(Miss_Inspection_Moderator)***	**.492**	**.440**	**9.365**	**.000**

Dependent Variable – Project Performance *(Operational - CPARS)*

As follow-up to the model results, we evaluate the relationships between the variables in each of the statistically significant models to test the hypotheses. Table 13 provides the standardized regression coefficient (B), unstandardized regression coefficient (Beta), the statistical significance of B (Sig.), the associated hypothesis, and the VIF for each of the predictor variables, for the operational measure (*CPARS*) of *Project Performance*. The structure of the models and variables in Table 13, mimic the hierarchy in Table 12. Because the F-test of Models #3 and #5 are statistically significant, we interpret and only show the results for the individual regression coefficients in these two models.

Table 13
Regression Coefficients Summary – Safety Preparedness and Project Performance *(Operational - CPARS)*

Model	Variable Name *(Measure)*	Hypothesis	Standardized Coefficients - Beta	Sig.	VIF
3	Constant			.018	
	Risk Exposure		-.088	.646	1.682
	Project Size		.000	1.00	3.440
	Culture of Safety *(Observations)*	1a	-.181	.602	5.462
	Culture of Safety *(Certifications)*	1a	.352	.097	1.938
	Safety Plan *(Inspections)*	2a	**-.623**	**.002**	1.455
	Safety Plan *(Audit)*	2a	-.096	.631	1.837
5	Constant			.000	
	Culture of Safety *(Certifications)*	1a	**.280**	**.046**	1.030
	Safety Plan *(Inspections)*	2a	**-.646**	***.000***	1.016
	Safety Performance *(Miss_Inspection_Moderator)*	2b	**-.277**	**.047**	1.025
Dependent Variable – Project Performance *(Operational - CPARS)*					

Model #5 of Table 13 shows three statistically significant individual regression coefficients. First, the *Inspections* measure of independent variable, *Safety Plan*, is positively associated with increased operational *Project Performance* (Beta = -.646; Sig. = .000). (Although the sign of Beta is negative, this is an artifact of the Log 10 transformation process.) This provides partial support for Hypothesis 2a, which predicts a positive association between Safety Plan and Project Performance. This variable is also significant in Model #3, (Beta = -.623; Sig. = .002), providing further confidence in Hypothesis 2a.

Second, the *Certifications* measure of the independent variable, *Culture of Safety*, positively relates (Beta = .280; Sig. = .046) to the operational measure (*CPARS*) of *Project Performance*. This provides partial support to Hypothesis 1a, which predicted a positive association between the *Culture of Safety* and *Project Performance*.

Finally, the individual regression coefficient for the *Near Misses* measure of the moderator, *Safety Performance*, is statistically significant (Beta = .277; Sig. = .047), suggesting that, as predicted in Hypothesis 2b, an increase in safety performance positively moderates the relationship between the independent variable, *Safety Plan* and *Project Performance*. The size of the standardized regression coefficients (Beta) indicates the independent variable, *Safety Plan* (Beta = -.646), has a stronger effect on *Project Performance*, than the independent variable, *Culture of Safety* (Beta = .280).

Our subsequent post hoc statistical probe (Aiken et al., 1991) of the interactive effect shows that the addition of the moderator, *Safety Performance*, improves the explained variance for Model #5 by 7.5 percent (see Appendix F), and that this increase is statistically significant at the 0.05 level. The change in slope of the lines in Figure 10 indicates that at high levels of *Near Misses* the relationship between *Project Performance* and *Safety Plan* grows stronger.

Although a high level of *Near Misses* is an indication of a site with high potential for injury because of the sheer number of interactions with the potential to result in an accident, a high level of *Near Misses* also presents multiple deliberate learning opportunities of the kind highlighted by Zollo & Winter (2002). In a firm with robust safety processes, the reporting and documenting of *Near Misses* results in follow-up corrective actions, such as incident reviews, root cause analysis, lesson learned, re-enactments and changes in the processes and procedures. In turn, the codification and sharing of knowledge resulting from *Near Misses* improves the effectiveness of the safety plan inspections. Consequently, in an environment with high potential for injury (high *Near Misses) and* a strong safety plan – as indicated by high inspection score results – the result is outstanding operational performance as graded by the client. That is, the more dangerous the situation (the greater the number of Near Misses) the more important is the safety plan in insuring operational performance.

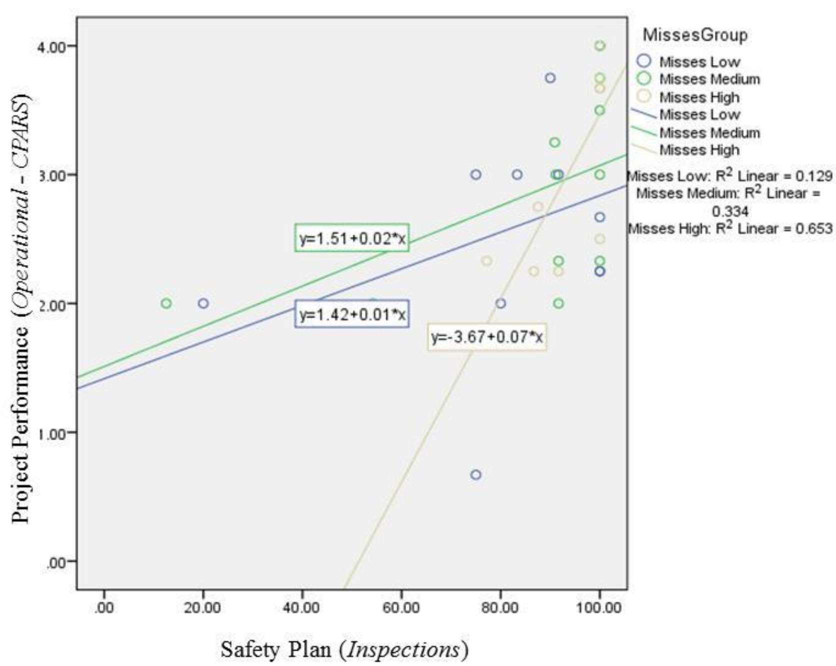

Figure 10 – Plot of Interaction between Safety Plan and Project Performance (*Operational – CPARS*)

Summarizing the model results for the financial measure (*Profit Margin*) of *Project Performance*, Table 14 shows R Square, Adjusted R Square, R Square Change, and the statistical significance (Sig.) of the model F-test. The F-test for optimal model (#10) is statistically significant (Sig. = .008) with an Adjusted R-Squared explaining 34.1 percent of the variance in *Project Performance*.

Table 14
Model and ANOVA Summary – Safety Preparedness and Project Performance *(Financial - Profit Margin)*

Model	SPSS Regression Method	Variable Name *(Measure)*	R Square	Adjusted R Square	R Square Change	F	Sig.
6	Enter	Constant, Project Size, Risk Exposure	.071	.009	.071	1.151	.330
7	Enter	Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations)*	.181	.063	.109	1.542	.217
8	Enter	Constant, Project Size, Risk Exposure , Culture of Safety (Certifications, Observations), Safety Plan *(Inspections, Audit)*	.201	.016	.02	1.087	.396
9	Enter	Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations),*Safety Plan *(Inspections, Audit),* Safety Performance *(Injury_Audit_Moderator, Miss_Inspection_Moderator, Miss_Certification_Moderator, Injury_Certification_Moderator, Injury_Inspection_Moderator, Miss_Observation_Moderator, Injury_Observation_Moderator, Miss_Audit_Moderator)*	.556	.210	.355	1.608	.170
10	Backward Step Wise	Constant, Project Size, Risk Exposure, Culture of Safety *(Certifications, Observations),* Safety Performance *(Injury_Cerification_Moderator, Injury_Observation_Moderator)*	.464	.341	-.092	3.757	.008
Dependent Variable – Project Performance *(Financial - Profit Margin)*							

Subsequent to the model tests, we conduct T-tests interpreting the relationships between the variables from the individual regression coefficients presented in Table 15. Again, the optimal or best-fit model (#10) shows multiple statistically significant associations between variables. The *Observations* measure of the independent variable, *Culture of Safety*, positively relates (Beta = .818; Sig .012) to the financial measure (*Profit Margin*) of *Project Performance,* as proposed by Hypothesis 1a. On the other hand, while the *Certifications* measure of the *Culture of Safety* is significant (Beta = -.501; Sig .018), the direction is contrary to that posited in Hypothesis 1a.

Table 15
Regression Coefficients Summary – Safety Preparedness and Project Performance *(Financial - Profit Margin)*

Model	Variable Name *(Measure)*	Hypothesis	Standardized Coefficients – Beta	Sig,	VIF
10	Constant			.010	
	Risk Exposure		-.552	.009	1.841
	Project Size		-.471	.084	3.336
	Culture of Safety *(Observations)*	1a	**.818**	***.012***	4.435
	Culture of Safety *(Certifications)*	1a	**-.501**	***.018***	1.925
	Injury_Observation_Moderator	1b	-.490	*.030*	2.211
	Injury_Certification_Moderator	1b	.804	***.001***	2.284

Dependent Variable – Project Performance *(Financial - Profit Margin)*

Model #10 also indicates that *Safety Performance,* measured by the *Recordable Injury Rate,* moderates the relationship between the *Culture of Safety* and *Project Performance*, as posited in Hypothesis 1b. Our separate post hoc statistical probe (Aiken et al., 1991) shows that the addition of the moderator, *Safety Performance,* results in 28.4 percent (see

Appendix F) increase in the variation explained. The strength of the relationship between the dependent variable, *Project Performance (Financial - Profit Margin)*, and the independent variable, *Culture of Safety*, changes as a function of the different levels of the moderator, *Safety Performance*. The relationship between *Project Performance* and *Culture of Safety*, measured as *Observations*, grows stronger (R Squared Linear = .088) for projects with zero recordable injury rates, as indicated by the increase slope in Figure 11 scatterplot. That is, on a project with recordable injuries, the culture of safety does not increase financial performance. However, the culture of safety has a positive association with financial performance when there are no recordable injuries – possibly, because there is a financial and productivity consequence of injury. On the other hand, years can go by without recordable injuries, so this moderating effect may not tell us much about the link between safety culture and financial performance at the project level.

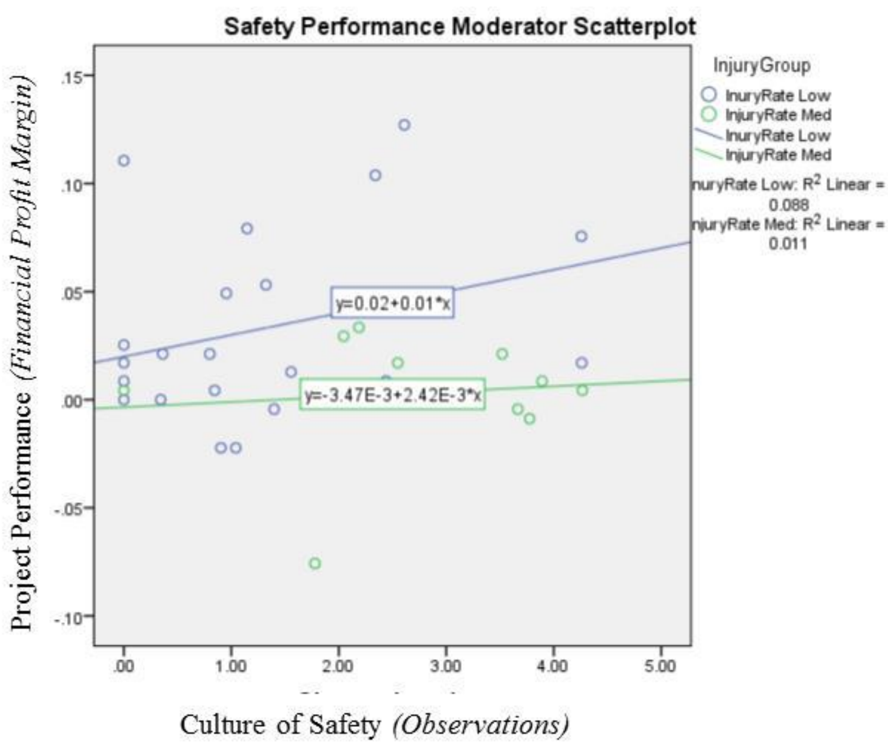

Figure 11 – Plot of Interaction between a Culture of Safety and Project Performance (*Financial – Profit Margin*)

STUDY 2

DISCUSSION

The major finding of our study is that, at the project level, safety processes and a culture of safety convert workplace safety preparedness into enhanced performance. This finding addresses a meaningful gap in the literature concerning which organizational preparedness factors enables firms to perform in a dangerous world (Czinkota et al., 2010; Fowler et al., 2007).

Consistent with a number of studies (Fernández-Muñiz et al., 2009; Mossink & de Greef, 2002; O'Donnel, 2000), we found that *Safety Preparedness*, operationalized as creating a culture of safety, enhanced *Project Performance*, where performance was measured using a financial metric (*Profit Margin*). Interestingly, *Safety Preparedness*, operationalized as safety processes and procedures (safety plans), was not associated with financial *Project Performance* – suggesting that the practice of safety, rather than plans to practice safety, affect financial performance. See Figure 12 for a summary of the findings for the financial measure *(Profit Margin)* of *Project Performance*.

On the other hand, when the measure of *Project Performance* was measured by client ratings service quality, cost control, management effectiveness, and adherence to schedule (*CPARS*), there was a positive association between the client perception of *Project Performance* and both *Safety Plan* (Hypothesis 2a) and the *Culture* of *Safety* (Hypothesis 1a). That is, safety culture is associated with performance, however measured (financial performance or client assessment of performance), whereas safety plans are associated only with client assessment of performance.

Further, the association between the client assessment of project performance and safety plans was particularly high in the presence of multiple dangerous events (*Near Misses*), suggesting that preparation adds performance value when danger is perceived (Hypothesis 2b). Importantly, the connection that safety performance in a dangerous environment *(*high *Near Misses)* augments operational performance of the project provides evidence of the positive performance impact of deliberate learning (Zollo & Winter, 2002).

From a business perspective, the finding that both safety culture and safety plans improves performance, as measure by the client in the CPARS rating, has key positive spill-over effects on brand reputation, project manager promotions, and winning contracts. Since the CPARS database is the government's primary source of past performance information in the competitive selection process for future contracts, the higher CPAR rating can result in winning new contracts. The grading of project by the client is particularly salient in the U.S. Federal contracting industry, but some form of client grading of project performance occurs in all industries. See Figure 13 for a summary of the findings for the operational measure *(CPARS)* of *Project Performance*. Finally, Table 16 summarizes our hypothesis tests.

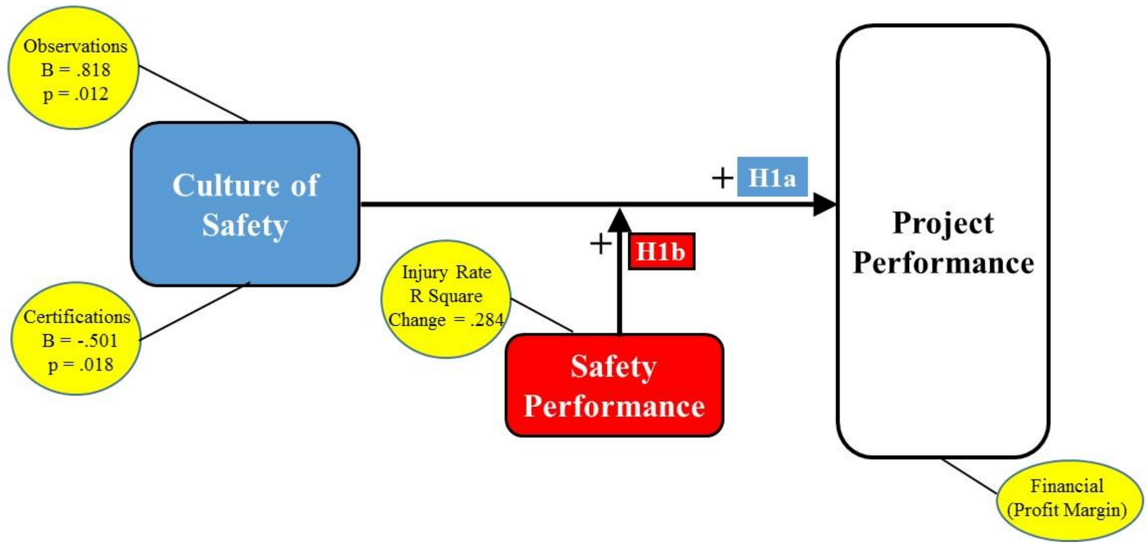

Figure 12 – Safety Preparedness and Project Performance (*Financial* - *Profit Margin*)

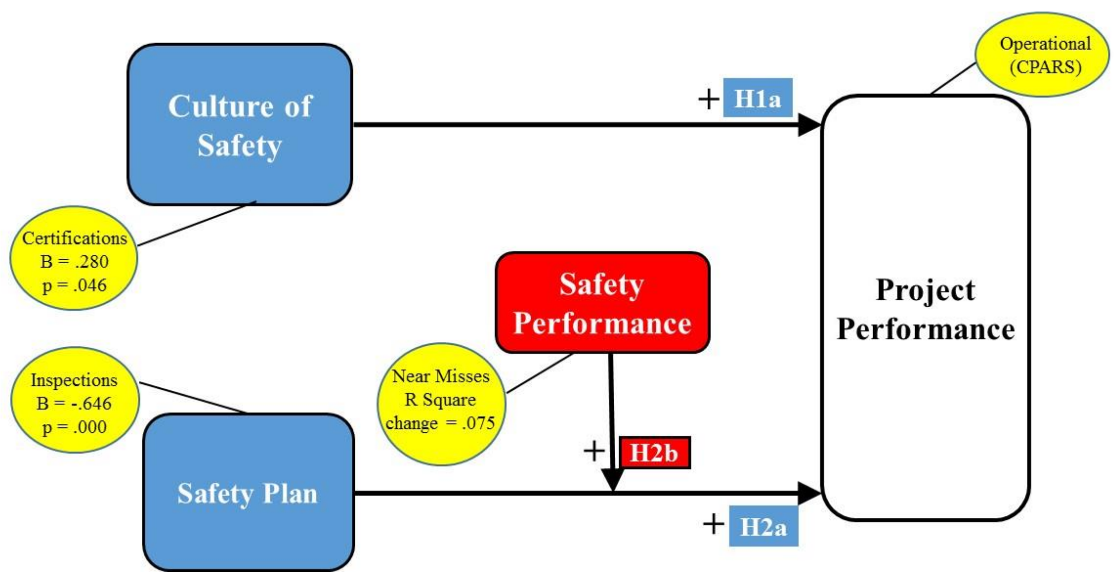

Figure 13 – Safety Preparedness and Project Performance *(Operational - CPARS)*

Table 16
Hypotheses Test Summary – Safety Preparedness and Project Performance

Hypothesis	Variable			Dependent – Project Performance	
	Type	Name	Measure	*Operational – CPARS*	*Financial* **-** *Profit Margin*
1a	Independent	Culture of Safety	Observations	Not Supported	**Supported**
			Certifications	**Supported**	***Partial Support***
1b	Moderator	Safety Performance	Recordable Injury Rate	Not Supported	**Supported**
			Near Misses	Not Supported	Not Supported
2a	Independent	Safety Plan	Inspections	**Supported**	Not Supported
			Audit	Not Supported	Not Supported
2b	Moderator	Safety Performance	Recordable Injury Rate	Not Supported	Not Supported
			Near Misses	**Supported**	Not Supported

Connections to the Literature and Practice

Our finding that *Safety Plan* positively relates to operational performance on a project, as judged by the client, and that this association is stronger in the context of a high level of *Near Misses*, combine to indicate that the codification of knowledge into organization process systems such as a safety management system plays a role in increasing the performance of the organization (Fernández-Muñiz et al., 2007b; 2009). Further, the development and implementation of safety control systems seem to have greater influence on client-graded operational performance than does institutionalizing a culture of safety prevention. This reinforces the notion that investment in safety control systems pays off in client satisfaction.

Our finding that the *Culture of Safety* positively relates to the client's perception of the operational and financial performance of a project is consistent with the literature highlighting the unintended positive impacts of a culture of accident prevention (Mossink & de Greef, 2002). Interestingly, we found no trade-off between building a culture of safety and performance. Indeed, building a culture of safety is a low-risk, high-return strategy that during usual times improves both financial and "client grading" operational performance and even during bad times (injuries) does not hurt performance. Furthermore, we found that *Safety Performance* accentuates the connection between a *Culture of Safety* and financial performance. This reinforces the notion that, practically, corporate responsibility initiatives such as promoting a culture of safety improve both the workplace and financial performance.

Less clear is how a *Culture of Safety* might lead to project performance. Related literature suggests that it could be because a strong culture of accident prevention enhances performance through less absenteeism, more motivated personnel, improved morale (Fernández-Muñiz et al., 2009; Mossink & de Greef, 2002) and better organizational culture (Barling et al., 2002; Griffin & Neal, 2000; O'Donnell, 2000). It would be worthwhile to explore causality and mechanism in more detail.

Contrary to our expectations, the data did not support our hypothesis that *Safety Performance* moderates the relationship between the *Culture of Safety* and operational performance. However, we found support that *Safety Performance* accentuates the connection between *Safety Plan* and operational performance. The nature of the linkage between operational performance and the safety management system (*Safety Plan*) changes as a function of *Safety Performance* as measured by *Near Misses*. In an environment with high potential for injury (high *Near Misses)*, the relationship between *Project Performance* and *Safety Plan* grows stronger (Figure 10). This shows the positive performance impact of deliberate learning (Zollo & Winter, 2002) from *Near Misses* and suggests that the strength of the safety plan serves as an important corrective to dangerous conditions. Indeed, robust safety performance (as measured by the blunter measure of recordable incidents) seems to be associated with process discipline, lower insurance costs, reduced liability costs, improved quality of service, and increased innovative capacity (Fernández-Muñiz et al., 2009; Mossink & de Greef, 2002; Shikdar & Sawaqed, 2003). This finding is consistent with the lack of an interaction in our data between the recordable incidents measure of project safety, safety preparedness, and project performance.

Most importantly, our findings suggest that, holding company, industry, project size and project risk constant, safety plans and culture of safety have a differential effect on project performance. This new finding sheds a little more light into the inner workings of firms operating in dangerous contexts. While it may be tempting to cut corners, paying attention to safety planning seems to improve operational performance, especially as judged by customers, and creating a culture of safety seems to improve both operational and financial performance. Together, these suggest that thoroughness, prevention, and care pay off in unexpected positive ways (Mossink & de Greef, 2002; O'Donnel, 2000).

Limitations and Future Studies

Not unlike other research studies, our study of safety preparedness and project performance has limitations. First, the proxy measures have limitations. For example, the *Audit* and *Inspections* measures of the independent variable, *Safety Plan*, primarily measure the percentage of compliance and completeness, but not the quality of the safety management process. Furthermore, there are minor differences in the content of the *Audit* and *Inspections* questions over the years.

Second, contrary to the directionality in Hypothesis 1a, we found support for a negative relationship between a *Culture of Safety*, measured as *Certifications*, and *Project Performance*. This could be a consequence of the certifications not being a sensitive enough measure of a *Culture of Safety*, as 57 percent (19 of 33) of projects had zero managers with a safety certification. Moreover, a simple count of certificates obtained, is not a measure of quality, such that an emphasis on certifications might signal, "checking the box" rather than truly paying attention to a culture of safety. More concretely, it could be that the time, effort, and costs required for supervisors to achieve the STS Certification might somehow negatively affect project profitability. Happily, the *Observations* measure of a *Culture of Safety* has a stronger influence on *Project Performance* than the *Certifications* measure of a *Culture of Safety*, suggesting that our findings hold.

Finally, at 33, the total number of observations is relatively small. While this quantity approaches the population of possible observations within the three-year window chosen, increasing the *n* would undoubtedly increase statistical power and provide results that are more robust. Similarly, although studying projects within one firm and one industry focuses the study on project performance, rather than on potentially confounding firm or industry variables, our insights would be even more persuasive and generalizable if the results were replicated across firms and industries.

STUDY 2

CONCLUSIONS ON RESEARCH CONTRIBUTION

Our dangerous and unsafe world is fraught with disasters, terrorism, political risk, and conflict. These escalating vulnerabilities pose an economic and safety risk to organizations and employees seeking to succeed in a challenging international environment. Study 2 addresses a limitation in our prior exploratory research on terrorism and international business by exploring how an international business prepares to perform under these adverse conditions. Rummaging deeper into how a company insulates performance from risks in this dangerous world, our research identifies how a firm translates the concept of organizational preparedness into performance. Notably, we reveal that safety preparedness, in the form of a culture of safety and safety plans, enhances operational and financial organizational performance. Because scholars and managers have primarily focused on traditional financial and quality functions to drive performance, and not on safety preparedness, our support for a direct link between workplace safety and organizational performance has meaningful implications.

First, the finding the organizational preparedness (Czinkota et al., 2010; Fowler et al., 2007) is linked to organizational performance reinforces the need for a theory of organizational resilience (Vogus & Sutcliffe, 2007) that explains both why more prepared organziations bounce back and outperform less ready ones and why some particularly organizations learn and grow stronger from adverse experiences (Jain & Grosse, 2009; Vogus & Sutcliffe, 2007). Second, the association between preparedness and performance in organizations in an increasingly dangerous world suggests academia should augment traditional financial and strategic management learning with coursework in organizational readiness such as safety management. Third, as executives develop and execute business strategies to perform in the face of terrorism, civil strife, and natural disasters, our study reinforces that organizational preparedness should become an increasing priority of international businesses. In summary, our story of translating organizational preparedness into performance provides an important step forward for business executives and researchers as we deliberately learn (Zollo & Winter, 2002) to perform under the sobering reality of increasing danger.

DISSERTATION CONCLUSIONS

We tell a two-part tale of organizational resilience to danger, grounded in the literature and executive insights, with growing practical and theoretical impacts. In a global environment now filled with an increasing array of threats, firms are under increased pressure to develop resilience to future attacks and unplanned disruptions. The literature, practical experience, and our two research studies indicate businesses translate the concept of organizational preparedness into performance resilience.

In the face of terrorism, Study 1 accentuates how organizational preparedness within international businesses has not kept up with the reality of the terrorism threat. Fittingly, Study 1 explores a gap in the literature concerning how firms use organizational preparedness to cope with terrorism. Our practical application of academic research shows that firms foster organizational preparedness by codifying knowledge and learning from experiences. Specifically, we suggest firms translate direct experience with terrorism and broader experience operating in high-risk locations into organization preparedness. Study 1 posits that this experiential deliberate learning (Zollo & Winter, 2002) form of organizational preparedness translates into performance resilience to future terrorist attacks. Our first incident level study explores a compelling phenomenon with a promising model and grounded predictions, but the data does not support the hypotheses.

Undeniably, the world is dangerous, but the projects performed by international business are also unsafe. Applicably, our second study delves deeper into firm operations connecting organizational preparedness and performance at the project level. In so doing, we address a gap in the research and a limitation in our prior research. Our results show that firms are capable of translating organizational preparedness, operationalized as safety preparedness, to improve performance in hazardous environments. Moreover, we identify that international business institute both hard control systems (safety plan) and soft environmental factors (culture of safety) to convert preparedness into improved performance. Practically, our support that *Safety Performance* accentuates the link between a safety oriented culture and financial performance underpins the idea that corporate responsibility, such as a culture of accident prevention, matters for social well-being as well as financial performance.

Our incident and subsequent project level studies, exploring the connection between resilience factors (such as organizational preparedness) and performance, provides future research directions at the nexus of academic study and business practice. For example, our research focuses on the rebound phase of resilience (Gal, 2014; Gittell et al., 2006; Henry & Ramirez-Marquez, 2012; Werther, 2014) following a disruption. Whereas, a future study could emphasize the second phase of resilience to theoretically (Jain & Grosse, 2009; Vogus & Sutcliffe, 2007) and practically explain how more resilient organizations grow stronger from a crisis. Similarly, a follow-on applied research direction could investigate how firms translate factors of performance resilience into a sustainable dynamic capability in our dangerous world. In summary, resilience to danger is an ever-increasing priority for international businesses and they must be prepared to perform.

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APPENDIX A

STUDY 1 - SAMPLE SIZE DEMOGRAPHICS

Multi-National Enterprise	Terrorism Incidents
McDonalds	33
Coca-Cola	12
Shell	11
Peugeot	10
Renault	10
British Petroleum	6
General Motors	6
Ford	5
Yum	5
Dole Food Company	4
Exxon	4
POSCO	4
Toyota	4
7-Eleven	3
Burger King	3
General Electric	3
Nissan	3
IBM	2
Chevron	2
Hyundai	2
Mercedes	2
Microsoft Corporation	2
Nike	2
Pepsi	2
Suzuki	2
Apple Computer	1
Caterpillar	1
Corning	1
Ecopetrol	1
FedEx	1
Fiat Chrysler	1
Fuji	1
Mazda	1
Mitsubishi	1
Occidental Petroleum	1
Starbucks	1
Texaco	1
Grand Total	**154**

APPENDIX B
STUDY 1 - CORRELATION DATA

Variable Description		Performance Resilience	Terrorism Exposure	Time Since Last Attack	Breadth of Experience	BCP
Performance Resilience	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	154				
Terrorism Exposure	Pearson Correlation	.023	1			
	Sig. (2-tailed)	.775				
	N	154	154			
Time Since Last Attack	Pearson Correlation	-.082	***.527****	1		
	Sig. (2-tailed)	.311	.000			
	N	154	154	154		
Breadth of Experience	Pearson Correlation	.072	.032	.113	1	
	Sig. (2-tailed)	.376	.696	.162		
	N	154	154	154	154	
Business Continuity Plan	Pearson Correlation	-.101	***-.338****	-.040	.097	1
	Sig. (2-tailed)	.215	.000	.621	.231	
	N	154	154	154	154	154

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX C

STUDY 2 - DESCRIPTIVE STATISTICS

Descriptive Statistics (Before and After Transformations)										
Variable	Measure	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
		Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Dependent Variable - Project Performance	CPAR	33	0.67	4.00	2.80	0.81	-0.25	0.41	-0.24	0.80
	Profit Margin	33	-3.65	9.61	0.56	2.80	1.95	0.41	4.55	0.80
	Profit Margin Log	33	0.80	1.29	1.01	0.10	0.90	0.41	2.65	0.80
Independent Variable - Culture of Safety	Observations	33	0.00	18440.00	2400.30	5413.38	2.48	0.41	5.07	0.80
	Observations Log	33	1.00	4.27	2.10	1.13	0.78	0.41	-0.77	0.80
	Certifications	33	0.00	19.50	2.52	4.51	2.37	0.41	5.94	0.80
	Certifications Log	33	1.00	1.47	1.08	0.12	1.75	0.41	2.53	0.80
Independent Variable - Safety Plan	Audit	33	1.00	100.00	90.13	17.86	-4.15	0.41	20.23	0.80
	Audit Log	33	0.00	2.00	0.72	0.52	0.32	0.41	-0.45	0.80
	Inspections	33	12.50	100.00	86.94	21.13	-2.53	0.41	6.61	0.80
	Inspections Log	33	0.00	1.95	0.69	0.68	0.20	0.41	-1.49	0.80
Moderating Variable - Safety Performance	Injury Rate	33	0.00	6.96	0.70	1.44	3.10	0.41	11.15	0.80
	Injury Rate Log	33	1.00	1.23	1.03	0.05	2.66	0.41	8.10	0.80
	Misses	33	0.00	1251.00	90.86	251.16	3.94	0.41	16.00	0.80
	Misses Log	33	1.00	3.10	1.50	0.55	1.43	0.41	1.77	0.80
Control Variables	Risk	33	0.40	0.97	0.77	0.17	-0.63	0.41	-0.73	0.80
	Size	33	500.00	5236544.00	515926.03	1023259.74	3.59	0.41	14.66	0.80
	Size Log	33	2.71	6.72	5.08	0.87	-0.54	0.41	0.58	0.80
	Valid N (listwise)	33								

APPENDIX D

STUDY 2 - CORRELATION DATA

Measure	Data Description	DV - Project Performance		IV - Culture of Safety		IV - Safety Plan		Moderating Variable - Safety Performance		Control Variables	
		CPAR	Profit Margin	Observations	Certifications	Inspections	Audit	Injury Rate	Near Misses	Risk Exposure	Proect Size
CPAR	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	33									
Profit Margin	Pearson Correlation	**.350***	1								
	Sig. (2-tailed)	.046									
	N	33	33								
Observations	Pearson Correlation	.178	.017	1							
	Sig. (2-tailed)	.322	.924								
	N	33	33	33							
Certifications	Pearson Correlation	.180	-.163	***.650*****	1						
	Sig. (2-tailed)	.316	.364	.000							
	N	33	33	33	33						
Inspections	Pearson Correlation	***-.600*****	-.243	-.179	.097	1					
	Sig. (2-tailed)	.000	.173	.320	.590						
	N	33	33	33	33	33					
Audit	Pearson Correlation	-.300	.040	***-.534*****	-.217	**.415***	1				
	Sig. (2-tailed)	.090	.826	.001	.225	.016					
	N	33	33	33	33	33	33				
Injury Rate	Pearson Correlation	-.057	**-.360***	**.399***	**.360***	.090	.048	1			
	Sig. (2-tailed)	.754	.040	.021	.040	.617	.793				
	N	33	33	33	33	33	33	33			
Near Misses	Pearson Correlation	.018	-.100	***.706*****	**.422***	-.037	-.118	***.504*****	1		
	Sig. (2-tailed)	.922	.581	.000	.015	.838	.514	.003			
	N	33	33	33	33	33	33	33	33		
Risk	Pearson Correlation	-.080	-.267	**.371***	.164	.033	**-.396***	.228	.113	1	
	Sig. (2-tailed)	.656	.133	.033	.362	.855	.023	.201	.531		
	N	33	33	33	33	33	33	33	33	33	
Proect Size	Pearson Correlation	.090	-.007	***.772*****	***.579*****	-.001	-.277	**.374***	***.661*****	.019	1
	Sig. (2-tailed)	.620	.969	.000	.000	.997	.119	.032	.000	.917	
	N	33	33	33	33	33	33	33	33	33	33
*. Correlation is significant at the 0.05 level (2-tailed).											
**. Correlation is significant at the 0.01 level (2-tailed).											

APPENDIX E

STUDY 2 - FACTOR ANALYSIS DATA

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.539
Bartlett's Test of Sphericity	Approx. Chi-Square	35.017
	Degrees of Freedom	6
	Significance	.000

Rotated Component Matrix[a]

Factor	Component	
	1	2
Certifications	.914	
Observations	.867	
Inspections		.893
Audit	-.422	.749

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in three iterations.

APPENDIX F

STUDY 2 - MODERATOR PROBE ANALYSIS DATA

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.646[a]	.417	.378	.63900	.417	10.730	2	30	.000
2	.701[b]	.492	.440	.60664	.075	4.286	1	29	.047

a. Predictors: (Constant), Certifications, Inspections

b. Predictors: (Constant), Inspections, Certifications, Near Misses_Inspections_Moderator

c. Dependent Variable: Project Performance (Operational - CPAR)

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.425[a]	.181	.063	.03926	.181	1.542	4	28	.217
2	.681[b]	.464	.341	.03294	.284	6.890	2	26	.004

a. Predictors: (Constant), Size, Risk, Certifications, Observations

b. Predictors: (Constant), Size, Risk, Certifications, Observation, Injury_Observartions_Moderator, Injury_Certfication_Moderator

c. Dependent Variable: Profject Performance (Financial - ProfitMargin)